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ABSTRACT

To understand and describe a developmental learning progression of choices students make in forming chains of relationships in their narrative texts, a study used the Cohesive Harmony Index to measure cohesion in children's written narratives. Data were obtained from 36 grade school children at intervals of four months over the students' first four years of school. Cohesive harmony was expressed as the ratio of central tokens, (lexical items related through identity, or coreferential, chains) to relevant tokens (lexical items participating in similarity, or coclassificational, chains). Coding of the narrative texts followed the scheme set out in "Cohesion in English" by Halliday and Hasan. While it was expected that cohesive harmony scores would improve gradually over a period of years, results showed that children who were able to write stories rapidly achieved high levels of cohesive harmony at the beginning of second grade. Identity relations took precedence in early writing, while similarity relations came to dominate children's fourth grade texts. Furthermore, although reiteration was expected to be a major chain-forming relation in children's first stories and to gradually diminish in importance as children developed, it grew in importance over the entire four years studied. (An appendix describes the primary procedures for obtaining and analyzing the data.) (HOD)

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A LONGITUDINAL STUDY OF COHERENCE IN CHILDREN'S WRITTEN NARRATIVES

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INTRODUCTION

Considerable effort and attention have been devoted to describing and explaining various aspects of children's writing development during the last decade. One strand of research has investigated children's spelling (Cazden, 1975; Chomsky, 1972; Read, 1975). These studies demonstrate that children learning to spell gradually shift from inventing their spellings to producing conventional spellings. In a similar vein, other studies have focused on letter formation, word formation, and the emergence of written messages (Harste, Burke & Woodward, 1981; King et al., 1981; Olay, 1975; Wheeler, 1971). In general, this group of studies indicates that, from their earliest attempts to write, children attribute meaning-bearing capabilities to written signs and symbols. Still other research has concentrated on the complexity of children's oral and written syntax (O'Donnell, Griffen & Norris, 1967; Potter, 1967; Richardson et al., 1975; Rosen, 1969). In substance, this research shows that as children mature, they tend to write longer and more complex sentences depending on task and mode of production (King et al., 1981; Rosen & Rosen, 1973).

Other work of a different character from that above has focused on children's composing processes (Graves, 1983). There appear to be three dimensions to composing: planning, production, and revision. These dimensions overlap and there is considerable variation in how children execute each dimension. Similarly, another strand of research has probed how children deal with the cognitive demands of composing (Bereiter & Scardamalia, in press, Scardamalia, 1981) seeking to explain how instruction can facilitate developmental-cognitive processes inherent in writing. Their research has shown that, within generous developmental parameters, instruction embodying simplified examples and procedures, concrete routines and options, and tangible labels for concepts children already possess can help them solve commonplace problems encountered within each phase of the composing process.

Another vein of recent research has addressed the question of how children relate various threads of meaning in their texts (Collins & Williamson, 1981; Garber, 1980; King et al., 1981; King & Rentel, 1982; Pappas, 1981; Pettegrew, 1981). This latter group of studies, in common, have described distributions of cohesive ties (Halliday & Hasan, 1976), and have found that patterns of cohesion vary as a function of development and mode of production.

What seems to emerge strikingly from the entire range of studies reviewed briefly above is the notion that children recruit and adapt their various linguistic resources to convey meanings in their texts. Even when confronted by unreasonable or unrealistic instructional tasks that require children to go beyond their current cognitive resources (Scardamalia, 1981), their intention to convey meaning while improvising form stands out as a distinctive characteristic of writing development, a characteristic that has been reported often in language acquisition research as well.

That children should employ language functionally is not surprising since function may, indeed, be the most important characteristic of human language. However, beginning writing instruction often missess this point. Both instruction and research have concentrated on more obvious and tangible areas of learning such as handwriting, spelling, punctuation, and syntax. Only recently have researchers begun to examine writing as a communicative process and to characterize children's linguistic knowledge at the level of discourse. But there is still little if any awareness of these characteristics reflected in primary writing instruction or curriculum (Emig, 1981). And without this awareness, teachers will misunderstand the logic of children's efforts to write and will fail to apprehend the true nature of writing growth and development.

Children's conceptions of given communicative ends as well as the situational demands made upon these conceptions undoubtedly influence their rhetorical and linguistic choices. How to select and use devices that effectively communicate their intentions in a given context of situation may be one of the more significant problems children confront and solve at the outset of learning to write. As noted briefly earlier, a handful of studies have begun to investigate the kinds and distributions of linguistic choices children make at the level of text. Because of their potential importance to an understanding of writing development, these studies will be reviewed in detail. Of the various areas of linguistic inquiry into the nature of discourse (e.g., pragmatics, discourse organization, semantics, stylistics, cohesion), only cohesion and stylistics have been explored in any detail for beginning writing development.

Before turning to studies of cohesion in children's texts, a detailed explanation of Halliday and Hasan's (1976) work on cohesion should prove helpful since most of these studies have relied upon their theoretical categories of text cohesion. Though other formal analyses of text have been proposed (Enkvist, 1973; Van Dijk, 1973), they have not as yet found their way into the literature on beginning writing development, in part, because text linguistics is a relatively new area within linguistic science, and in part, because the Halliday and Hasan analysis of text cohesion provides an exceptionally comprehensive and detailed basis for describing semantic relationships within texts.

Cohesion

Cohesion defines five categories of semantic relations that link components of texts through co-interpretation. That is, there are meaning relations that obtain between elements of a text such that one is interpretable only through another. For example, consider the following excerpt from a child's story:

(1) Once upon a time there was a dragon who could not fly.
(2) One day he went to ask his friend, the bird, what to do.

In sentence (2) he and his can be interpreted only through reference to dragon in sentence (1). The relation between he and dragon is that of

identity of reference. He refers to no other dragon than the one who could not fly. The interpretation of he clearly rests on its presupposed relation to dragon. Likewise with his. Both he and his are personal pronouns, one of three types of reference defined by Halliday and Hasan as a distinct category of text-forming relation. The other two sets within this category are demonstrative reference and comparative reference. Demonstrative reference identifies a referent through verbal pointing. Like personals, demonstratives such as the, this, these, those, here, there, now, and then refer to something in the text or in the context of situation. The following excerpt illustrates one kind of demonstrative reference:

(3) Once upon a time [there was] a house in the woods.
(4) In the house there was a man and a little girl.

The in sentence (4) signals which house and establishes identity of reference.

Comparative adjectives and adverbs also refer to elements within a text or in a context of situation. Comparison denotes a likeness between things, thus requiring co-interpretation of the compared elements. An example of comparative reference follows:

(5) One night-- a long, cold, wintry night in January-- a big dog named February was thrown out in the snow.
(6) On that same night a little girl named Sally was walking home.

The adjective same points backward to night in the previous sentence. The relation is one of identity. Like pronominals and demonstratives, comparatives establish relations between elements of a text through presupposition (Also, see (9) and (10) below).

In addition to reference, Halliday and Hasan (1976) define four other kinds of cohesive relations: substitution, ellipsis, conjunction, and lexical cohesion. These four categories of cohesive relations will be defined and illustrated briefly below.

Substitution as a cohesive relation depends upon relations in wording. Like reference, substitution can link elements of a text, but whereas reference establishes relations at a semantic level, substitution defines relations on a lexicogrammatical level. Substitutions are lexicogrammatical place markers. They are used instead of repetition, and they ordinarily have the same grammatical function as the word or group of words for which they substitute. Substitution may occur for nouns, verbs, or clauses; hence, nominal substitution, verbal substitution, and clausal substitution. Both nominal substitution and nominal ellipsis are illustrated in the following text:

(7) This witch had three magic pots.
(8) One was for turning people into very pretty people.
(9) Another was for turning people into very ugly people.
(10) And the other one was for casting wicked spells on people.

One in sentence (8) is functioning as the cardinal numeral one with pot understood. This is a case of ellipsis. But in sentence (10) one is functioning as a nominal substitute. It is a place holder for pot, and like pot, can be either singular or plural, but numeral one is, of course, singular.

Verbal substitution is accomplished through do substituting for lexical verbs in the verbal group. Similarly, clausal substitution is accomplished ordinarily through so and not substituting for reported clauses, conditional clauses, and modalized clauses. Substitution is extremely rare in children's narratives (King et al., 1981), thus, contrived examples will be used to illustrate verbal and clausal substitution. In the following example of verbal substitution, do acts as a place holder for the lexical verb swam.

(11) Bill swam the 50-meter butterfly event only.
(12) He would have done the breast stroke had he not gotten a cramp.

Clausal substitution employs so and not as substitutes. Their use in clausal substitution is illustrated below:

(13) Everyone says that Michele is in excellent condition for the race.
(14) If so, she should win; if not, she may lose.

Both so and not in sentence (14) substitute for the clause, Michele is in excellent condition for the race, not additionally indicating negative polarity for the condition.

Ellipsis is very similar to substitution. Ellipsis, like substitution, is based on filling a structural slot, but without a structural place holder. Instead, the structure itself presupposes that something is understood and must be supplied from previous text. Ellipsis may occur at the level of nominal group, verbal group, or clause. In the following excerpt from a child's story, verbal ellipsis is illustrated:

(15) The door almost slammed on her.
(16) But it didn't.

In sentence (16) didn't is a modal operator filled out by the lexical verb slam. It may be helpful to contrast verbal substitute do in sentence (12) with verbal operator do in sentence (16). Recall that done substituted for swam in this sequence. The two sentences contrasted butterfly with breast stroke. It is in such an environment that substitution often takes place-- those contexts where some element of the structure is repudiated. The finite verbal operator do expresses a purely grammatical function and can never substitute for a lexical verb. In sentence (16) didn't expresses simple past tense, polarity and finiteness while the cohesive relation with the previous sentence is accomplished through ellipsis of slam, the lexical verb.

Naminal ellipsis occurs when the common noun is omitted from the nominal group and some other element from the group functions as head. In the child's text that follows, adventure is ellipsed in sentence (18) and one functions as head in the clause.

(17) When she was outside, she made lots of friends and went on lots of adventures.
(18) One was finding his [her] way through the garden.

In this sequence one is functioning as the cardinal numeral one rather than as substitute one. Substitute one may be either singular or plural but cardinal one is naturally singular. Adventure in this case was ellipsed from its position as head and is "understood." One further point of clarification may be necessary. The indefinite article one can occur elliptically as head in the nominal group, and etymologically, is a weakened form of the numeral one. In written English, ambiguity between numeral and indefinite article one may result; however, the numeral one is always salient and may carry tonic prominence, but the article one is rarely salient and never carries tonic prominence (Halliday & Hasan, 1976; p. 100). In sentence (18) one is both tonic and salient.

Clausal ellipsis is illustrated by the following question-response sequence from a child's story:

(19) "Where is the motorcycle?" said the man who owned the pet shop.
(20) "I don't know." said the little boy.

The cohesive presupposition between (19) and (20) rests on the ellipsis of where the motorcycle is from the commentary, "I don't know."

Conjunction is another kind of cohesive relation. Unlike reference, substitution, and ellipsis, conjunctive relations are not directly cohesive. They express particular meanings which presuppose other discourse components that occur in succession. Conjunctive relations are not the same as the basic logical relation of coordination. Conjunctive relations are generalized textual relations that link sentences rather than text components. There are four basic categories of conjunctive relations: additive, adversative, causal, and temporal. These categories are given by Halliday and Hasan (1976), but as they note, "There is no single, uniquely correct inventory of the types of conjunctive relation; different classifications are possible, each of which would highlight different aspects of the facts" (p. 238). Each category of conjunction expresses a relation which can be realized through other linguistic means. For example, cause can be expressed through predication, minor prepositional predication, and the like. In describing conjunctive relations as cohesive, it is their function of relating sentences that occur in succession specifying how each is connected to what has gone before that is cohesive. It is these functions that the conjunctive categories capture.

Just one of many possible items from each category will be illustrated for each type of conjunction mainly to provide an impressionistic notion of the category. The first to be illustrated is the additive category.

(21) Then a wild storm came.
(22) And it blew Glinda clear to the South Pole.

The cohesive function of and in this case appears to be that of linking two facts additively while realizing their implicit causal relation through predication. The additive and has been accorded a purely textual function by the child who wrote this text.

Adversative conjunction enters into a sentence sequence cohesively by specifying the relation as meaning "contrary to the previous information." This relation is indicated unambiguously by the child who wrote the following text:

(23) Sally was so happy!
(24) But just then Sally stopped being happy.

Causal conjunction may connect successive sentences through the meaning of general cause indicated by so, thus, hence, and the like, or through specific cause such as for this reason, as a result, or for this purpose. General cause is illustrated in the following text:

(25) Soon she got tired but there was no one to carry her home.
(26) So she decided to rest awhile.

Temporal conjunction means simply 'subsequent in time.' It is most often expressed in children's narratives through then or and then. This type of conjunction is illustrated below:

(27) "Oh," said Abby, "I want to walk on that rainbow so bad."
(28) Then she noticed that no one had seen that the rainbow was touching the ground.

Reference, substitution, ellipsis and conjunction in their various ways derive their cohesive quality from grammatical sources within the language. The remaining category of cohesion, lexical cohesion, achieves a cohesive effect through the selection of vocabulary. Basically, there are two types of lexical cohesion, reiteration and collocation, with the class of general noun occupying something of a special place in the category of reiteration. Reiteration is the cohesive effect achieved when a word is repeated, or when a synonym, superordinate term or general noun produce a pattern of recurrence. General nouns such as people, creature, thing, stuff and the like operate cohesively as superordinate synonyms. They are accompanied by the definite reference item the. Both the general noun and the demonstrative appear to combine as a signal that the same referent is presupposed. As Halliday and Hasan (1976) note, general nouns seem to occupy a borderline region between grammatical and

lexical cohesion. All instances of reiteration however do not depend on identity of reference. General nouns, being what they are, require definite reference to avoid ambiguity of presupposition. But reiteration achieves its cohesive effect through lexical dimensions alone. This separate effect of lexical presupposition is illustrated as follows:

(29) All the time Abby daydreamed about walking on a rainbow.
(30) One day she looked up and in the sky was a rainbow.

The rainbow that Abby saw cannot be construed as the one she daydreamed about. The relationship between these repeated instances of rainbow derives from purely lexical sources, not from identity of reference.

Collocation is the cohesive effect of lexical co-occurrence of items typically associated with one another. Such pairs as sleep...dream, run...walk, dog...bone, and menu...restaurant rely not on particular semantic relationships for their cohesive effect but on their sharing the same lexical space. Halliday and Hasan admit the category is elusive and that further work is needed to specify its properties; however, they argue that the cohesive effect of collocation is obviously apparent and no less real than other cohesive relations in text. The following excerpt illustrates collocation:

(31) Once upon a time there was a duck.
(32) He sat in a pond all day watching the fish in the water.

Duck, pond, and water are in close textual proximity and, quite likely, are in close semantic proximity to one another. Both kinds of proximity may account for the cohesive effect of collocation.

Halliday and Hasan systematize the general concept of cohesion somewhat further by classifying the direction of cohesive relationships as endophoric (within the text) and exophoric (outside the text). Those within the text are further classified as anaphoric (backward pointing) or cataphoric (forward pointing). Although general nouns, ellipsis, and more rarely, substitution can posit something outside the text for their interpretation, the category of exophoric relations pertains mainly to reference items. Most cohesive ties depend on previous items for their interpretation.

The basic concepts and categories implicit in the analysis of cohesion provide an unusually comprehensive means for describing relationships in texts. It is not surprising that this system of analysis has been adopted for investigating characteristics of writing as well as the discourse choices writers make. With the background afforded by this brief review, we can now examine the research literature on cohesion in children's texts.

Cohesion in Children's Oral and Written Texts

The concept of cohesion specifies relations of meaning within a text thereby promising the analytic potential to identify differences in the

ways writers and speakers connect segments of text. This potential for sorting out differences in kinds of discourse at specific points in development opened the way for a variety of studies which sought to describe and explain dimensions of children's writing development. One rather widely held view was that analyses of cohesion would permit theorists to examine and explain how oral discourse capabilities interact with newly emerging facets of relating meanings in written texts (Collins & Williamson, 1981; Guandlach, 1981; King et al., 1981; King & Rentel, 1982; Pappas, 1981; Pettegrew, 1981). King and Rentel (1979) argued that distributions of cohesive relations in children's oral and written texts would vary as a function of developmental accomodation to the distinctive demands of each channel of communication. Writing, disembedded from focal action, personal contact, and situation, would logically entail a realignment of oral capabilities for young children. This realignment could be expected to move from texts having the earmarks of spoken discourse--higher proportions of reference to assumed situational contexts, lower proportions of explicit lexical cohesion, and higher proportions of ellipsis-- to texts marked by little if any exophoric reference, lower proportions of ellipsis, and higher proportions of lexical cohesion.

To a great extent the analysis of cohesive ties has indeed been a reliable means for identifying developmental and mode differences in children's texts. Children's dictated narratives appear to predict the course that their written narratives eventually take (King & Rentel, 1982), with proportions of exophoric reference, reference, conjunction and lexical cohesion in writing equalling proportions of these same kinds of ties in dictated narratives by the time children reach the middle of their second year of schooling. But, by the end of children's second school year, cohesion in their written texts emerges with its own distinctive distributions, written texts marked by higher proportions of lexical cohesion and lower proportions of exophoric reference (Rentel & King, 1982b). In a related study (Pettegrew, 1981), comparing fluent, transitional and beginning readers' use of cohesive devices in two narrative contexts, Pettegrew found that fluent readers employed fewer exophoric references and more lexical cohesion in their dictated and retold stories than did transitional and beginning readers. She concluded that literacy encourages children to shift from less to more explicit use of language more appropriately attuned to the requirements of indirect, abstract contexts of situation. Pappas (1981) also compared patterns of cohesive relations in varying narrative contexts employing an index of patterning, the cohesive harmony index (Halliday & Hasan, 1980), and found that first-grade children retold stories more coherently than they either dictated or wrote stories; and that they dictated stories more coherently than they wrote stories. Pappas also incorporated a measure of cohesive density, a ratio of lexical items entering into cohesive chains to total lexical items in a text. On this measure, children differed significantly only in the cohesive density of their retold and written texts.

The comparison between cohesive harmony and cohesive density is interesting because it reveals that the two measures are reflecting quite different properties of texts. Cohesive harmony, since it taps the interaction between chains of cohesive ties and factors operating in sentences, reflects the degree of coordination between textual relations and sentence relations. Cohesive density simply reflects the degree of connectedness between components of a text. Pappas argued that cohesive harmony indicates the extent to which children have acquired an understanding of a genre itself while cohesive density suggests the extent to which children have become sensitive to the "facts" of textual relationships. We shall return to this distinction in the next section on cohesive harmony and explore its significance in greater depth.

Collins and Williamson (1981) also investigated cohesive ties in written texts comparing good and poor expository essays at three grade levels (four, eight and twelve), assuming that exophoric personal and exophoric demonstrative reference indicate a writer's dependence on oral text-forming strategies. They reported that poor essays contained significantly greater frequencies of exophoric reference, but since they failed to control for text length, their findings essentially are uninterpretable. Their assumption that exophoric reference is more characteristic of oral than written texts has been supported by other findings (King et al., 1981; King & Rentel, 1982; Rentel & King, 1982; Witte & Faigley, 1981), thus it is reasonable to suppose that written texts containing exophoric reference are more difficult to interpret than those with less exophora and could be expected to receive lower scores from raters.

Studying older students' compositions (college freshmen), Goldberg (1980) compared their spoken, dictated, and written texts controlled for audience and purpose, and concluded that proportions of lexical ties were higher in writing than in speaking or dictation; that proportions of reference ties were higher in dictated texts than in spoken and written texts; and that proportions of grammatical and lexical ties were equally represented in spoken texts. These findings for young adults mirror those for late second-grade children (King et al., 1981; King & Rentel, 1982; Rentel & King, 1982). It would appear that distinct patterns of cohesive ties for texts produced in different modes emerge rather early in writing development and persist through early adulthood. But, while it is clear that patterns of cohesion can account for mode differences and may reflect choices writers make at varying stages of development, the theoretical and practical significance of these patterns is only now becoming clear. We shall examine these recent theoretical developments next.

Cohesion Coherence and Cohesive Harmony

What makes a text hang together has been of more than just passing interest to rhetoricians since Aristotle's Poetics, and of fundamental importance to students down through the ages as they have sought to comply with their teachers' exhortations to write coherently. But the advice

students have gotten generally has been short on specifics. Their dilemma has been to act on suggestions such as this:

> Ideally, the concrete supporting details within a paragraph should be held together (should be made to cohere) in a way that is harmonious, natural, logical, aesthetically pleasing. To accomplish that kind of coherence, you will find it most helpful to ask yourself several questions and to answer them before beginning to write and again while writing. (Schneider, 1971, p. 33).

The questions that Schneider then poses, though helpful, still are very abstract. He suggests that students ask themselves what voice they will choose, what audience they will address, what tone they will take toward their audience, and what stance they will adopt toward their subject matter. The examples he gives and the recommendations he makes for dealing with each question are very concrete. In many respects, his suggestions are even more concrete than those given in other rhetoric texts. Yet, to the student, these suggestions and others like them must have a mirage-like quality. They appear corporeal but vanish as students reach for the abstractions of voice, audience, tone and stance.

Other rhetoricians have underscored the importance of coordinate arrangement, connective devices, logical order, and unity. Since Alexander Bain (1877), writing pedagogues have urged that sentences of a text be "woven together" (McCrimmon, 1967) or that the parts of a text be interdependent and non-autonomous (Lybbert & Cummings, 1969). The problem with this sort of instruction is that it suggests no discrete, reproducible model for organizing sentence sequences into a coherent text (Markels, 1981). Further, it implies no graduated instructional progression from less to more complex arrangements, and no clearly definable basis for conceptualizing instructional goals and purposes. Without such clarity, measuring growth in writing skill will continue to be handicapped by poorly defined, vague, wholistic measures or by irrelevant analytic measures of punctuation, usage, and the like. In either case, measures of this sort do not yield instructionally useful or interesting insights about coherence.

Recent theoretical developments have led to a greater understanding of cohesion and coherence and they provide a means whereby instructional goals, learning sequences, and achievement measures can be hypothesized and tested. One of the basic purposes of this study was to understand and describe a developmental learning progression of choices students make in forming chains of relationships in their narrative texts from the vantage point afforded by these theoretical advances. An understanding of this developmental progression is a necessary step for conceptualizing pertinent instructional goals, activities and measures for writing instruction.

Two key theoretical advances made it possible to describe the development of coherence in children's narratives. One was Halliday and Hasan's (1980) formal analysis of the relationship between cohesion and coherence posited as the construct "cohesive harmony." The other was Markels' (1981) formalizing of the concept of cohesion in English expository paragraphs through an analysis of the relationships between nouns and noun chains. These two works set forth independent but compatible explanations of what makes a text hang together.

As will be shown shortly, these two explanations differ in important ways but basically agree on the nature of essential semantic and syntactic interrelationships that contribute to coherence.

One potentially confusing difference between these two explanations resides in their separate positioning of the relationship between coherence and cohesion. Hasan (in press) argues that cohesion is "the phenomenon on which the foundation of coherence is laid, but that the presence of coherence requires a particular type of calibration of cohesive relations (p. 1)." This "calibration" is achieved through assigning distinct textual functions to lexical and grammatical cohesive ties such that two major categories of extended text relations are posited: identity chains and similarity chains. These chains are formed through distinctively different semantic bonds. Identity chains are related through pronominal cohesion, instantial equivalence (boy-little leaguer), generic lexical repetition, or through combined grammatical and lexical cohesion (a man, a woman, the couple). The semantic bond for identity chains is that of co-referentiality. The semantic bonds for similarity chains are co-classification and co-extension. Co-classification is achieved through simple lexical repetition or through substitutive or elliptical cohesion. Co-extension is realized through lexical cohesive categories whose meaning relations are based on semantic fields. When two or more members of similarity or identity chains stand in the same grammatical relation to two or more members of another chain, a synthesis of componential and grammatical relations is realized. These interactions, in combination with the effects of chaining, make significant contributions to the unity of a text. Within the Halliday and Hasan (1980) conception, cohesive ties are building blocks for coherence.

Markels (1981), on the other hand, argues that cohesion is "a superordinate term embracing both 'unity' and 'coherence' and is defined as the presence of a dominant term, either directly or inferentially, in each sentence of a paragraph (p. viii)." She hypothesizes that the patterning of dominant terms produces a structural totality in paragraphs that she defines as single-term paragraphs, double-term chain paragraphs, and mixed chain paragraphs. Within Markels' conception, coherence is a function of unity, which, in its simplest form, is the recurrence of the same dominant term appearing in a sentence's subject position. Coherence, she argues, is the orderly arrangement of recurrences functioning to make recurrence relations explicit.

Halliday and Hasan (1980) differ in one other respect from Markels in that, from their perspective, cohesion is a necessary but not sufficient basis for coherence. To be coherent, a passage must also maintain consistency of register. Register is a set of meanings that are realized typically in specific contexts of situation-- that is, the social, expressive, communicative and representational substance of language in use. Both cohesion and register are required for a text to be coherent textually and functionally (Halliday & Hasan, 1980). They argue that a text must establish relevance not only between its internal components but with its use in some context of situation.

In other respects both Halliday and Hasan's and Markels' formulations are similar, even though Markels' analysis is limited to expository paragraphs. Both posit the existence of recurrence chains similarly

classified as identity and similarity chains, each type of chain substantially derived from markedly similar if not the same analytic and theoretical accounts. Both sets of analyses argue for an interaction between recurrence chains and syntax. In both formulations, an interaction between at least two members of recurrance chains is a minimum condition for coherence. Reference, ellipsis, and substitution are considered partial forms of repetition in both accounts. Both accounts make identical distinctions between lexical and grammatical cohesive devices. In both, cohesion is a general set of text-forming relations critical for the creation of a manifest totality. a sense of interpretive wholeness. Both assume a connection between cohesion and situation, in Markels' case, the knowledge-based inferences of readers; in Halliday and Hasan's case, the contextual relevance of language as a system. Finally, both accounts posit that coherence is variable.

Markels argues that to the extent recurrences manifest a totality, to that degree a paragraph is cohesive; however, she makes no attempt to formalize variability. In Halliday and Hasan's work, variability is formalized as the construct "cohesive harmony." The degree of coherence in a text is a function of the interaction between recurrence chains such that the amount of chain interaction is a direct correlate of coherence. Cohesive harmony is a scaled set of values for these interactions. It is a ratio of the frequency of lexical items participating in chain interactions to the frequency of lexical items participating in recurrence chains. The higher the ratio of cohesive harmony, the greater a text's coherence. In short, cohesive harmony is an estimate of text coherence.

Pappas (1981) employed this cohesive harmony estimate to compare first-grade children's story retellings, original dictated stories, and original written stories. She found that children's retellings were more coherent than their dictated stories and that their dictated stories were more coherent than their written stories, but that regardless of task, stories did not differ in clause complexity, and only written and retold stories differed in cohesive density, a ratio of lexical items participating in recurrance chains to total lexical items in the text. Thus, in addition to intrinsic textual and contextual factors that affect coherence, at the outset of learning to write, so do factors associated with scribing affect coherence. The cohesive harmony index appears to tap a unique source of variance in texts, variance theoretically defined as coherence.

Hasan (in press) has obtained only informal evidence from a limited number of subjects comparing their rankings of coherence for three texts against estimates derived through the index. She reports identical rankings for subjects' informal judgments and cohesive harmony "scores." Accordingly, there is weak evidence supporting the measure's empirical validity. The real case to be made for the measure however resides in its logical validity. Its logical and theoretical antecedents are highly persuasive. As such, the cohesive harmony index appears to have great potential utility as a measure of text coherence and as an index of growth in an important dimension of writing development. Further, the derivation

of the index from identity and similarity chains, the constituents comprising these chains, and patterns of chain interaction all hold promise as sensitive indicators of how children grow in their ability to make a text hang together.

PROCEDURES

Cohesive Harmony Procedures

1. Recurrence chains. The first step that must be taken to establish recurrence chains is an analysis of grammatical and lexical cohesion. All grammatical and lexical cohesive devices must be identified along with their interpretive source and their phoric status. Then semantic bonds between ties are classified as co-referentiality, co-classification, or co-extension. Co-referentiality ordinarily is established through pronominals and definite articles. Comparative reference may be either co-referential or co-classificational. The ultimate referents for all co-referential ties are denoted to establish chain connections for identity chains. Similarity chains are likewise established, but by no means as free of problems as identity chains. Before describing classification procedures for similarity relations, these problems will be considered briefly.

Hasan (in press) makes the following observation:

> The triumphs of modern linguistics are more noticeable in the realms of grammar and phonology; by comparison, lexis is a neglected area. Despite suggestive leads from different approaches..., the categories for the description of lexis are no more than a shot in the dark. This has the consequence of creating problems of decision making at every step in the analysis (p. 17).

These problems boil down to developing a reliable, operational system for recognizing alternative realizations of the same lexical category, the possibility of lexical ties entering into both a collocative and a reiterative chain, or the possibility of conjunction or disjunction of chains.

To resolve these problems, Halliday and Hasan (1980) argued that general lexical cohesive ties are based on language-wide, supra-textual bonds. One type is that in which, irrespective of text, each member of a pair is synonymous (pitch, throw). These they define as having experiential meaning. Just as pitch and throw are synonyms, pitch and catch are related as antonyms. Both synonyms and antonyms are instances of semantic bonds with language-wide meaning relations having identity of experiential meaning (Hasan, in press). Members of a class and part-whole relationships also are instances of language-wide meaning relations. In the former, hyponymy, the meaning of one member of a pair subsumes the

meaning of the other. Hyponymy is a function of differing degrees of generality characteristic of the organization of the lexicon. For example, table is a member of the more general class of things called furniture; table and chair are related through this inclusion in a class: they are co-hyponymys. Table and leg however are part-whole relations. This relationship is a sense relationship termed meronymy.

The last of these supra-textual ties is simple reiteration. This is the case where both members of a tie are the same lexical item. While the relation between them may be one of identity, the relation may also be one of similarity. For example, consider the following:

(33) Once there was a [sic] ugly queen.
(34) She loved Christmas.
(35) But she was not queen of anything.

The queen in (33) is specific while the queen in (35) is non-specific and does not have a bond of identity with the queen in (33). It is simply the fact that the same meaning is being encoded by these two instances of queen but not the same identity. Like the relations of synonymy, antonymy, hyponymy, and meronymy, that for reiteration in the example above exists in the system of language. The semantic bond they share is that of co-classification.

These categories of similarity chains eliminate many of the problems associated with the elasticity of collocation. They are sufficiently discrete to assure consistent chain identification and analysis. They replace collocation even though they do not necessarily handle the range of relations included within collocation (Hasan, in press). For example, teacher, lesson and school certainly are related and are collocative, but they cannot be fitted nicely within any of the five categories above. These categories merely enhance the reliability of identifying discrete similarity chains.

Similarly, instantial lexical relations, even though artefacts of the text itself, enhance reliable chain identification and analysis. Instantial lexical relations are of three types: equivalence, naming, and semblance (Hasan, in press). Equivalence is illustrated below by the relation between pitcher and boy. This relationship attains its status only through an utterance such as, "The boy was an excellent pitcher." The following text also illustrates equivalence:

(36) They saw a mouse.
(37) All three said, "Get out, you little rascal."

The text equates mouse and rascal. The system of language is not the source of this relationship. The text is.

Naming, as indicated above, is another kind of instantial lexical relation. This relationship is indicated quite fully by the child who wrote the following text.

(38) One night-- a long, cold, wintry night in January-- a big dog named February was thrown out in the cold.
(39) On the same night, a little girl named Sally was walking home.
(40) And she met the dog.
(41) When Sally got home, she pleaded and pleaded to see if she could keep the dog.

Semblance, the third type of instantial lexical cohesion, stems from the metaphorical resources of language. The following text is one of the few instances of semblance to be used in our corpus of children's texts:

(42) When I enter the next galaxy, I head for a planet called Hoth.
(43) The planet is like a snow barren field with strong winds.

Semblance along with equivalence and naming further delineate lexical cohesion thereby strengthing decision making with respect to similarity chains.

There are other ways of dealing with equivalence such as that proposed by Enkvist (1973) who ventured the following categories:

1. Co-membership of the same world field: Apples are ripe. Pumpkins are not.

2. Sustained metaphor: The flowers murmured their sweet caress. The wind sighed in their fragrant embrace.

3. Expanding hyponymy: The price of oranges has risen. But so has all fruit.

4. Contracting hyponymy: Flowers were everywhere. Tulips were most in evidence.

The added delicacy of these categories contributes no greater precision to the analysis of similarity chains, but the categories do underscore the essentially intuitive character of lexical categories as concepts.

Recall the third problem of classification noted above, that of chain conjunction or disjunction. For example, some chains are combined through joint reference as in the following text:

(53) Once there was a little girl.
(54) And she had a horse that could fly.
(55) One day she was on her horse.
(56) And someone said, "UFO!"
(57) And she said to the horse, "Up, Up."
(58) And the horse went up.
(59) They saw someone.
(60) And the horse started to fly.

Girl and horse are joined at they in (59) in the seeing of someone. But in (60) the disjunction of the two chains occurs.

A chain may begin by manifesting a simple, single identity. More complex chains may be created by combining two simple chains. When two chains are combined into a more complex chain, functional distinctions between the separate chains no longer exist. Whatever may be said of one identity may also be said of the other. When a complex chain splits, its division opens up the possibility of different functions for the separate entities. Therefore, both chain conjunction and disjunction provide opportunities for establishing different functions for and between identities (Hasan, in press). These chain conjunction and disjunction patterns may reflect content development within a text (Applebee, 1978; Hasan, in press).

Where functional significance becomes fuzzy, the possibility of referential ambiguity arises. In this circumstance, assigning a token to an identity chain may be impossible. For example, consider the next sentence in the text about the horse who could fly:

(61) "Stop it."

The speaker of this command is ambiguous. Is the girl speaking or is it the horse? Had the text remained ambiguous on this point, the procedure was to subtract one point from the central-token score (lexical tokens involved in chain interactions). In this case however, the ambiguity was resolved in the next sentence:

(62) The horse stopped.

All unresolved ambiguities resulted in a reduction of the central tokens score for a text thereby lowering the cohesive harmony score. At any point in a text where ambiguity was resolved, its resolution was assumed to apply to all preceding co-referentiality for the chain thereby maintaining the central tokens score while increasing the relevant tokens score (lexical tokens occurring in similarity and identity chains) by the number of resolved reference tokens, and potentially increasing the central tokens score should these resolved tokens enter into chain interactions. The interaction of chains and scoring procedures for establishing central and relevant tokens now may be examined in detail.

2. Chain interaction. What remains is to identify how individual chains interact with each other to provide the remaining source of lexical tokens for the computation of the cohesive harmony index. Chain interactions occur when "two or more members of a chain stand in an identical functional relation to two or more members of another chain (Hasan, in press, p. 38)." Halliday's (1967a, 1967b, 1968) transitivity system provided the basis in the present study for determining how chains interact with one another, but other grammars are not excluded as potentially useful in categorizing interactions. The major reason for selecting systemic grammar was the inclusion of a discourse component in

this grammar. The kinds of functional relations that system networks identify are those of epithet-thing, medium-process, process-phenomenon, actor-process, process-goal, and the like. For example, in the second grader's text that follows, there are three identity chains and four similarity chains.

(44) One day a girl named Cindy went outside when it was raining.
(45) She saw a chest in the garage.
(46) She tried to get it open.
(47) But she could not get it open.
(48) Finally she got it.
(49) Out came monsters and stuff.
(50) She screamed and screamed and screamed.
(51) Finally she stopped.
(52) And she got used to them and invited them in for milk and cookies.

One of this text's identity chains is that established by the co-referentiality of girl (Cindy) with she in units (45), (46), (47), (48), (50), (51) and (52). This chain interacts with the similarity chains established for get, open, and scream as well as with the identity chain for chest formed by its co-referential relation with it. For the sake of simplicity and clarity, only similarity chains that derive their cohesive status through reiteration will be illustrated now. Other kinds of similarity chains will be illustrated later. Within Halliday's (1967a) transitivity systems, actions and ascriptions are subsumed as types of processes expressed in a clause, along with participants in the process, and the attributes and circumstances of both process and participants. Structurally, a process functions in a clause as predicator; participants function as the clausal elements subject and complement, while attributes and circumstances are associated structurally only with the clausal element complement. Halliday posits three process types: directed action, non-directed action and ascription; three participant types: actor, goal and attribuant; and one attribute. Each of the primary elements of clause structure, predicator, subject and complement, expresses different functions or roles. The subject may be an actor, a goal, or an attribuant. The predicate may be an action or an ascription, and the complement may be a goal or an attribute. Presented as they are here in their most general sense, these categories comprised the basis on which interactions were determined.

Considering now the identity chain established for girl, this chain interacts with the similarity chain established for get in (46), (47) and (48). In (46), the relationship between girl (she) and get (got) is one of directed action, she functioning as actor within the clause's subject structure and get as a directed-action process within the clause's predicate structure. These same syntactic and role relations are maintained through (47) and (48), satisfying the requirement that two or more members of a chain stand in identical functional relation to two or more members of another chain. These two chains interact as well with the one established for chest in (45), (46), (47) and (48). The one presupposing

chest is an identity chain created by the co-referentiality of it referring anaphorically to chest. This chain interacts with the chain formed by get with chest functioning as goal in the clause's complement structure for the chain linking units (46), (47) and (48).

Each of these three chains was established on the basis of semantic relations prevailing within each chain linking components of the text. The interaction of these chains with one another produces an additional source of compatibility between parts of a text. As Hasan (in press) observes, "...similar things are said about similar/same 'entities,' 'events,' etc. (p. 38)." Interactions produce consistency of grammatical relations within the clause and the group, that, in turn, are linked to cohesive chains, thus establishing a patterned set of relationships throughout the text.

The lexical tokens that participate in chain interactions comprise a subset of lexical items from the text. Halliday and Hasan (1980) label this subset "central tokens." They maintain that this set of tokens directly reflects the development of topic in a text and is a direct correlate of the coherence of a text. Cohesive harmony expresses the ratio of central tokens to relevant tokens, the lexical items participating in identity and similarity chains. The higher the ratio of central tokens to relevant tokens-- the lexical items participating in identity and similarity chains -- the greater the text's cohesive harmony.

Recalling the text at the beginning of this section on chain interaction, (p. 17) this text will serve as the basis for illustrating all the chain relationships and interactions that comprise the various subsets of tokens used to compute cohesive harmony scores. What follows is a worked example of analyses and scoring procedures for establishing identity chains, similarity chains, types of linkages within chains, chain interactions, derived central token scores and derived relevant token scores (See p. 19).

Reliability of the Cohesive Harmony Index

Given the number of separate categorizing decisions entailed by the cohesive harmony index, there is, of course, a question of reliability inherent in employing the index. To what extent are two independent raters likely to achieve the same cohesive harmony ratios for a sample of texts? To address this question, six texts from each of six observations (36 texts) were randomly selected and scored by two trained raters. Pearson produce-moment correlations between ratings were computed for this sample yielding a correlation of .77.

During the training period, raters collaborated on scoring two texts from the sample. They then scored the 36 texts in the reliability sample independently. It should be noted that both raters had wide experience categorizing cohesive ties; thus, the inter-rater reliability reported above may be higher than might be expected from less experienced raters.

Line	Identity Chains			Linkage Type	Similarity Chains					Linkage Type	Interaction (*) - Central Tokens	Identity and Similarity Chains Relevant Tokens
	I^1	I^2	I^3		S^1	S^2	S^3	S^4	S^5			
1.	girl, Cindy			I^1-naming								2
2.	girl (she)	chest		I^1-pronominal (personal)								2
3.	girl* (she)	chest* (it)		$I^{1,2}$-pronominal (personal)	try*	get*	open*				5	5
4.	girl* (she)	chest* (it)		$I^{1,2}$-pronominal (personal)	able*	get*	open*			S^1-meronymy $S^{2,3}$-reiteration	5	5
5.	girl* (she)	chest* (it)		$I^{1,2}$-pronominal (personal)		get*	open* (ellipsis)		finally	S^2-reiteration	4	5
6.			monsters									1
7.	girl* (she)			I^1-pronominal (personal)				scream*			2	2
8.	girl* (she)							scream* (ellipsis)	finally	$S^{4,5}$-reiteration	2	3
9.	girl (she)		2Xmonsters (them)	I^3-pronominal (personal)		get*						4

Figure 1. Identity Chains, Similarity Chains, Chain Interactions, Linkage Types, Central Tokens and Relevant Tokens

Procedures for Determining Identity-Similarity Chain Ratios

Data from earlier studies (King et al., 1981; King & Rentel, 1982; Rentel & King, 1982) indicate that proportions of lexical cohesive ties increase significantly in children's narratives while reference ties, after an initial increase, gradually decline before leveling off to a rate that remains stable over a rather long developmental period. To determine how these cohesive relations enter into chains as a function of development, ratios of similarity chains to identity chains were computed for each of the six observations of this study. In addition, frequencies of similarity-chain types were tallied; that is, frequencies of reiterative links within chains, synonymy links, antonymy links, hyponymy links and meronymy links. These frequencies were expected to reveal underlying patterns of chain formation as these patterns evolved developmentally.

Similarity chains pose a classification problem, as did identity chains earlier (p. 15). A similarity chain may contain reiteration, synonymy, antonymy, and conceivably hyponymy as semantic linkages for a given chain. A linkage of this sort poses no particular problems for cohesive harmony analysis, but does raise the question of how to tabulate chains for descriptive purposes--that is, determining how these distinct types of linkage should be tallied. The purpose of such an analysis is to clarify how children create similarity chains as they learn and mature, questions mainly of range and developmental order. Should the semantic bonds established by synonymy and reiteration within the same similarity chain be counted as separate instances of each or should new subclasses of similarity chains be formulated? Markels (1981) did, indeed, formalize such a subset for expository paragraphs; thus, it is possible that a subset of similarity chains could be derived empirically along developmental lines for children's fictional narratives, a subset that would reveal a great deal about the structure of children's narratives. While of great interest and potential significance, such an analysis was beyond the scope of this study. Instead, the issue here was to establish the descriptive bases for children's evolving notions of similarity and identity relations as a prelude to understanding the structural mechanisms underlying their competence. Given this objective, the important consideration was to identify and describe the range and distribution of their existing semantic distinctions as a function of development. The decision then was to tally subchains of reiteration, snynonymy, antonymy, hyponymy and meronymy as instances of types of co-classificatory and co-extensive sets. A similarity chain comprised of a reiterative subchain and a synonymous subchain was tallied as two distinct tokens of each type, thus creating a complex similarity chain. Simple similarity chains were defined as constructed from only a single co-extensive or co-classificatory relationship. A simple chain was tallied as one type.

Sample Selection

Written narrative texts were elicited from a population of 36 children stratified by sex, socio-economic class, dialect, and school at intervals of four months over the children's first four years of schooling. Only one set of texts was elicited during first grade and fourth grade, a total of six observations and 216 texts. Texts were screened to eliminate all but fictive narratives from the sample in order to control for genre variation, and since some children were not writing by late first grade, the selection of subjects for this analysis was further premised on a subject's ability to produce a fictional narrative by grade two. Even though children were asked to write a story of their own, not all stories were original nor were all texts stories. Two criteria were employed to judge whether a text was a story: (a) the presence of story markers such as 'once upon a time,' 'they lived happily ever after,' and such story conventions as magical powers, fantastical characters; and (b) a narrative stance which implied quasireal or imagined characters. Sixteen subjects who consistently wrote stories from grade two through grade five served as subjects in the following analyses. Of these sixteen subjects, seven produced first-grade texts that met these criteria, four produced no written texts at all, and five produced non-fictive narratives that chronicled school experiences.

Data Analysis Procedures

Cohesive harmony ratios (frequency of central tokens/frequency of relevant tokens) were organized into a one between-subjects, (observations) repeated-measures analysis of variance (ANOVA). A Geisser-Greenhouse adjustment for degrees of freedom was employed to correct for positive bias.

Pearson product-moment correlations were employed to compare cohesive harmony scores between grade intervals; and to compare cohesive harmony scores with similarity-identity chain ratios, and frequency of similarity and identity chains within grade levels. These correlations were computed to provide an estimate of shared variance between cohesive harmony scores at each grade level, and an estimate of shared variance between the cohesive harmony index and two of its text-level constituents--the latter estimates expected to indicate what each type of chain contributed to the index at each grade level.

Percentages were tabulated for subchain linkages (reiteration, synonymy, antonymy, hyponymy, and meronymy) as well as for frequency of similarity and identity chains as a percentage of total number of chains for each grade level. Means and standard deviations of subchain linkages were also computed to provide a basis for further interpreting cohesive harmony scores at each grade level. Finally, means and standard deviations were computed for similarity-identity chain ratios by grade level, again to broaden the interpretation of cohesive harmony scores.

FINDINGS

A repeated-measures ANOVA, employed to compare cohesive harmony scores, indicated a significant effect for grade level: $F = 8.75$ (5, 75), $p.$ (Geisser-Greenhouse)$<.0005$ (See Table 1). Tukey post-hoc comparisons of means indicated a significant increase in the cohesive harmony ratio between the end of grade one and the middle of grade two (See Table 2) for this sample of children who wrote stories by grade two.

Table 1

Cohesive Harmony Ratio ANOVA for Observation (Grade Level)

Source	df	MS	F	p.<*
Between Subjects				
Grade Level (A)	5	.3184	8.75	.0005
Subjects (S)	15	.0619		
Error (S)	75	.0363		

* Geisser-Greenhouse adjusted $p.< .0005$.

Frequency distributions of types of recurrance chains demonstrated that the significant increase in cohesive harmony ratios stemmed largely from substantial increases in the number and kinds of similarity relations children employed midway through grade two (See Table 3). First-grade texts included roughly .89 similarity chains for every identity chain; by the middle of second grade, narratives embodied two similarity chains for every identity chain. The same relative proportion of similarity and identity chains persisted through third-grade texts. For fourth-grade texts, the relative proportion of similarity chains to identity chains increased to 3.04; however, there was no corresponding increase in cohesive harmony ratios. Second grade texts averaged 3.63 identity chains and 8.00 similarity chains while fourth grade texts averaged 7.69 identity chains and 21.69 similarity chains (See Table 3). As a percentage of total number of chains, frequencies of identity chains and similarity chains were equally divided at grade one. At the beginning of second grade, similarity chains increased to 69 percent with identity chains declining to 31 percent of the total number of chains in the beginning second-grade sample. By mid-second grade similarity chains comprised 78 percent of the total; by third grade, 71 percent of the total; and by fourth grade, 75 percent of the total (See Table 3).

Table 2

Means and Standard Deviations of
Cohesive Harmony Ratios by Observation (Grade Level)

Grade Level	Mean	Standard Deviation
1.5	.36	.36
2.0	.68	.07
2.5	.60	.25
3.0	.69	.12
3.5	.75	.13
4.0	.70	.10

Table 3

Means, Standard Deviations, and Percentages of Identity and Similarity Chains and Chain Ratios by Observation (Grade Level)

Observation (Grade Level)	Identity Chains			Simiarity Chains			Chain Ratios	
	M	SD	Percent	M	SD	Percent	M	SD
1.7	1.81	1.28	50	1.81	2.01	50	0.89	0.76
2.0	3.63	1.54	31	8.00	4.60	69	2.02	0.74
2.5	3.87	1.77	22	7.50	4.02	78	2.04	1.17
3.0	4.44	2.03	29	11.13	7.73	71	2.59	1.54
3.5	7.19	3.21	23	13.38	5.14	77	1.97	0.56
4.0	7.69	2.18	25	21.69	10.14	75	3.04	1.59

Reiteration appeared to play the most significant role in similarity chain formation regardless of grade level (See Table 4). From mid-first grade through fourth grade, reiteration, as a factor in chain construction, accounted for a low of 50 percent (grade 1.5) of chain linkages to a high of 64 percent of chain linkages (grade 4.0). Synonymy ranged from 9 percent of similarity linkages to a high of 15 percent by grade three and then dropped to 12 and 7 percent respectively in mid-third and fourth grade. Antonymy, like synonymy, increased slightly from 6 percent of similarity linkages in grade one to roughly 10 percent through grades two and three, but dropped to 3 percent in grade four. Hyponymy accounted for 15 percent of chain linkages in grade one, ranged from 8 to 13 percent through third grade, and increased to 17 percent of all similarity linkages in fourth grade. Meronymy explained 20 percent of first-grade similarity linkages, 5 and 3 percent respectively of second-grade chain linkages, 12 and 11 percent of third-grade linkages, and 9 percent of fourth grade linkages.

Means increased from 1.19 reiteration linkages in grade one to 18.00 linkages in grade 4, followed in magnitude of increase by means for hyponymy which rose from 0.31 in grade one to 3.60 in grade four (See Table 4). Increases for synonymy, antonymy and meronymy means from grade one through grade four appeared to be roughly parallel except that means for meronymy continued to increase through grade four while those for synonymy and antonymy declined moderately in grade four. With the exception of reiteration, standard deviations indicated substantial variability for all linkage types at all grade levels (See Table 4).

Correlations among cohesive harmony scores ranged from moderate to low with only relationships between grades one and three, mid-grade two and grade three, and between mid-grade three and grade four achieving significance (See Table 5). Correlations between cohesive harmony scores and identity-similarity chain ratios ranged from zero-order to moderately high correlations. Those between cohesive harmony scores and identity-similarity ratios, relationships reflecting the composite contribution of identity and similarity chains to cohesive harmony scores, achieved significance for grades 1.5, 2.5, and 3.5 (See Table 6). These associations roughly paralleled those for cohesive harmony scores and similarity chain frequencies, correlations that achieved significance at grades 1.5, 2.5, and 3.0 (See Table 6). Of the correlations obtained for cohesive harmony scores and identity chain frequencies, only the association for grade 3.0 achieved significance (See Table 6). On the other hand, correlations between similarity chain frequencies and identity chain frequencies ranged from moderate to moderately high up through grade 3.5, all five relationships achieving significance (See Table 7).

Table 4

Means, Standard Deviations, and Percentages of
Types of Similarity Chain Linkages by Observation (Grade Level)

Observation (Grade Level)	Reiteration			Synonymy			Antonymy			Hyponymy			Meronymy		
	M	SD	Percent	M	SD	Percent	M	SD	Percent	M	SD	Percent	M	SD	Percent
1.5	1.19	1.56	50	0.19	0.40	9	0.50	0.13	6	0.31	0.60	15	0.44	0.51	20
2.0	5.31	3.75	61	1.06	1.24	12	0.88	1.26	10	1.00	0.97	12	0.44	0.51	5
2.5	5.81	4.04	63	1.31	1.20	14	0.81	0.54	9	1.06	1.06	11	0.94	0.74	3
3.0	8.63	6.63	55	2.13	1.54	15	1.63	2.45	10	1.40	1.35	8	1.88	1.50	12
3.5	11.63	7.83	54	2.63	1.50	12	2.13	1.75	10	3.00	2.00	13	2.25	1.53	11
4.0	18.00	8.98	64	1.84	1.94	7	1.03	1.00	3	3.60	5.06	17	1.67	2.56	9

Table 5

Correlations among Cohesive Harmony Scores by Grade Level

Grade	Grade					
	1.5	2.0	2.5	3.0	3.5	4.0
1.5	-	.26	.40	.54*	.30	.21
2.0		-	-.25	-.02	-.10	-.14
2.5			-	.61**	.07	.00
3.0				-	.30	.31
3.5					-	.48*
4.0						-

* p. < .05
** p. < .01

Table 6

Correlations Between Cohesive Harmony Scores and Similarity-Identity Ratios, Similarity Chain Frequencies and Identity Chain Frequencies

Grade Level	Cohesive Harmony Scores-Similarity-Identity Ratios	Cohesive Harmony Scores-Similarity Chain Frequencies	Cohesive Harmony Scores-Identity Chain Frequencies
1.5	.53*	.52*	.30
2.0	.16	.20	.30
2.5	.68**	.59**	.12
3.0	.10	.41*	.67**
3.5	.41*	.27	.00
4.0	.14	.16	.02

* p. < .05
** p. < .01

Table 7

Comparisons of Similarity and Identity
Chain Frequencies by Grade Level

Grade Level	Correlation of Similarity and Identity Chain Frequencies
1.5	.74**
2.0	.82**
2.5	.46*
3.0	.55**
3.5	.67**
4.0	.16

* $p. < = .05$
** $p. < = .01$

DISCUSSION

Developing Coherence in Writing

What seems most striking about this sample of children is the swiftness with which development occurred. Children who were able to write stories achieved surprisingly high levels of cohesive harmony at the beginning of second grade. By second grade, their scores had increased significantly from a mean of .36 to a mean of .69 (See Table 2). Their scores reflected a high degree of coordination between sentence and text level relationships. What is equally remarkable is that these children maintained this level of coherence even as they wrote stories of ever increasing breadth and complexity. At the beginning of second grade, their stories contained roughly 11 chains, 3.63 identity chains and 8.00 similarity chains. By the beginning of fourth grade, their stories contained over 29 chains, 7.69 identity chains and 21.69 similarity chains with a cohesive harmony mean of .70.

The major difference between first and second grade texts can be seen by comparing identity and similarity chain ratios. In first grade, children averaged less than one similarity chain for every identity chain they produced, but, in second grade, they averaged slightly over

two similarity chains for every identity chain they produced. This trend continued through fourth grade. In first grade, children appeared to be bent on establishing and maintaining clear relations of identity throughout their texts. Once having acquired the ability to maintain identity relations, their ratios of identity to similarity chains remained relatively constant through third grade as the frequency of both types of chains increased. Then, in fourth grade, again their relative frequency of similarity chains increased substantially to 3.04 similarity chains for each identity chain. However there was no concommitant increase in cohesive harmony means, perhaps explainable by substantial increases in the number of textual relationships children were now faced with coordinating and organizing. This explanation is given some credence by the strength of relationships observed between cohesive harmony scores and frequencies of similarity and identity chains. These correlations, .16 for cohesive harmony scores with similarity frequencies and .02 for cohesive harmony scores with identity frequencies, at grade four were the lowest correlations between these measures for any grade level. Fourth-grade cohesive harmony scores were more a product of children coordinating chain relationships with sentence relationships than a function of sharp increases in the number of similarity chains produced.

These data suggest that early in learning to write, this sample of children first chronicled familiar experiences primarily establishing identity relations that fit harmoniously within a somewhat repetitive event sequence. This pattern of texts and identity relations was typical of late first-grade, a conclusion supported by a companion study of cannonical correlations between characteristics of children's drawings and characteristics of their unassigned written texts (Zalusky, 1982). Zalusky concluded that children's drawings, done in conjunction with writing, functioned jointly with written texts to specify identity relations for the drawings they produced. Whether children drew a single picture or a sequence of drawings narrating an unfolding event, accompanying texts pointed deictically to the identities established in the drawings. The drawings themselves appeared mainly to "present" familiar objects and persons from the children's immediate environment--again, a form of identity.

As these children grew accustomed to maintaining unambiguous identity relations over entire texts, they seemed then to expand the range and extension of similarity relations in their texts. By second grade, the mean number of identity chains in texts increased from 1.81 to 3.63. But similarity chains increased from a mean of 1.81 to 8.00, an increase of 6.19 chains, the largest single grade-to-grade increase for either identity or similarity chains. Through grades two and three, texts grew longer but preserved about the same two-to-one ratio of similarity to identity chains. During this period, reiteration coupled with hyponymy steadily grew as a principal means for linking lexical relations. The significant correlations between cohesive harmony scores and frequency of similarity chains (See Table 6) provided moderate support for this interpretation. Also from mid-second grade through mid-third grade, children averaged twice as many similarity chains as

identity chains in their texts. This expansion of similarity relations coincides with earlier findings that these children began to write significantly more complex stories with almost no exophoric reference at approximately the same point in their development (King, et al., 1981; King & Rentel, 1982). These significant correlations between cohesive harmony scores and frequency of similarity and identity chains indicated that children were not only growing in their ability to construct chains but were doing so at about the same rate that they were acquiring the ability to coordinate and particularize these relationships in sentences as roles and structures. These equivalent grade-two-and-four cohesive harmony scores indicated that the same proportions of relevant tokens were entering into chain interactions regardless of large grade-level differences for recurrence chains. What the low grade-four correlations between cohesive harmony scores and recurrence-chain frequencies mean is open to speculation. Obviously this sample of children synchronized sentence and text level relations largely unaffected by either the length of their texts or by the range of identity and similarity chains they constructed. The correlations only suggest that once these children calibrated chain relations with sentence relations in second grade, the ability to construct additional chains continued to contribute to coherence through early grade three but contributed less and less to the level of cohesive harmony in their texts from mid-grade three onward. Of course, the cohesive harmony index taps only the effects of componential cohesion. What role, if any, children's added chain-forming abilities played in organic and structural cohesion is unknown. Nor is it clear how chain length may have affected cohesive harmony scores.

Measuring Cohesive Harmony

The concept of cohesive harmony (Halliday & Hasan, 1980; Hasan, in press) is an impressive theoretical foundation for measuring coherence in texts. It provides a reasonable and logical definition of text coherence with most if not all salient aspects of coherence incorporated in a straightforward ratio. Hasan (1983) has begun to address two of the remaining theoretical issues still unresolved and having a bearing on coherence: the contribution of organic cohesion to coherence and the contribution of structural cohesion to coherence. Organic cohesion refers to relations between whole messages rather than relations between message components. Such relations, for example, are conditionals realized through <u>and</u> or <u>or</u> and pair relations such as questions and answers. Structural cohesion is a class of relationships realized through the thematic and information structure of a text: theme and rheme and given-new distributions. Cohesive harmony reflects only the contribution of componential cohesive relations to coherence. Logically, organic and structural cohesive relations must be incorporated into the measurement of coherence. Some inkling of how they function in conjunction with componential cohesion recently has begun to take form in Hasan's work, again growing out of systemic theory (Halliday &

Hasan, 1980; Hasan, 1982; Hasan, in press). From a developmental perspective, Rentel (1981) also has argued that organic and structural cohesion are fundamentally an aspect of children's evolving notions of coherence in written texts-- those meanings that are essentially social interaction between writer and audience premised on conditional and other logical implications of speech functions and their relationships to the thematic organization of a text. This interpersonal dimension gradually reasserts itself as a more prominent facet of meaning encoded in children's written texts through their personal slant or point of view. The developmental evolution of this interpersonal dimension is closely related, of course, to the development of logical meaning and its expression as conditionality, coordination, subordination and the like. These theoretical questions must be resolved or, at least clarified, as a prelude to their inclusion in a more broadly conceived measure of cohesive harmony.

On practical grounds, measuring cohesive harmony is time-consuming and demanding. And the interscorer reliability noted earlier (.77) indicates that cohesive harmony judgments are influenced unquestionably by scorer characteristics. Reliabilities could be improved somewhat by further scorer training, but the level of expertise represented in the two scorers who analyzed and scored the texts was already considerable. To reduce the variance associated with scorer characteristics, and to enhance the practicality of the cohesive harmony measure, assistance was sought from computer scientists having expert language backgrounds, the purpose being to develop a computer-assisted form of text analysis. These efforts failed mainly because semantic theory has not progressed to the point where computer algorithms can be written and translated into reliable programs for analyzing textual relationships. In our view, cohesive harmony will become a useful and practical measure outside of research contexts when semantic theory advances beyond its current emphasis on referential meaning.

As a research tool, however, cohesive harmony as a measure is not only the most theoretically compelling construct available, but provides the only basis we know of on which a moderately reliable rank-ordering of coherence can be compared with other theoretically interesting constructs and measures of writing development. As further refinements, such as those above, are added to underlying theory for the measure, and cohesive harmony scores reflect the contribution of these facets of coherence, its value as a research tool is inestimable. Reader judgments of coherence lack any theoretical or construct validity. The relationship between the properties of cohesive harmony as a mathematical ratio and as a linguistic ratio are unambiguous and straightforward. Scores obtained from cohesive harmony estimates seem to square with reader judgments of coherence, although rigorous comparisons of the two remain to be done-- clearly a next step. But the theoretical backing for cohesive harmony alone is sufficient reason to warrant its further and expanded use as a research tool.

IMPLICATIONS

Children marshal their linguistic resources and bend them to the task of writing almost in defiance of the law of adult expectations. From second grade onward, the sample of children's texts we investigated thwarted our expectations about levels of coherence we could expect within them. Our expectation was that cohesive harmony scores would improve gradually over a period of several years. They did not. Cohesive harmony scores increased significantly from the point at which children could navigate the rudiments of a fictional narrative-- for most, at the beginning of second grade. We expected roughly parallel emergence of identity and similarity relations in children's texts. Identity and similarity relations followed a course separate from each other in the sense that identity relations took precedence in children's earliest texts, while similarity relations came to dominate their fourth-grade texts. We expected that reiteration would be an important chain-forming relation in children's first stories, but would gradually diminish as a chain-forming strategy. It did not; instead, reiteration was a basic chain-forming strategy from the outset of writing and grew in its importance as a chain-forming resource over the entire four years of development we studied.

Our initial expectations of coherence in children's texts probably were not unlike those of most adults. Nor is it likely that our views differed significantly from those held by teachers. Adult expectations are in part probably the product of generalizing from the problems that children seem most concerned about at the outset of learning to write: spelling, orientation, editing, and topic (Graves, 1983). Coherence does not seem to be a problem for children. But it is for teachers and adults-- whether as a result of being told that coherence is a problem or the result of factors typical of other writing tasks, genres, or later complexities of language in use. Therefore, adults may generalize their own uncertainties to children, or wrongly generalize other alleged difficulties, e.g., spelling, to coherence. Whatever the case may be, these children appear to possess the underlying capabilities to write coherent stories without benefit of direct instruction. Pappas' (1982) work comparing cohesive harmony ratios across children's retellings of stories, dictated stories, and written stories demonstrated that retellings and dictated stories were more coherent than stories children wrote at the same point in development-- late first grade. Thus, it is not so surprising to find that beginning second-grade texts were written by children at a significantly higher level of coherence. They simply required a brief opportunity to realign and recalibrate what they knew.

Instructional Implications

The extent to which these children wrote coherent stories illustrates an important rule of thumb for instruction. Children's skill in one facet of writing development will not necessarily imply the lack or possession of skill in other areas of development. This principle holds true

particularly for their text-forming abilities. Because until recently neither theory nor tradition permitted accurate assessment of children's text-forming capabilities, insights into function often were assumed from evidence about form. Thus, children's writing ability was characterized largely on the basis of form and structure, and conclusions about both were assumed to hold for other dimensions of writing development. Children's competence in creating coherent texts must be viewed and judged on grounds pertinent to function and language in use.

Nor at any given time can competence be generalized across modes and contexts. Comparisons between dictation, writing and story retelling (Pappas, 1981) suggest that children retell and dictate more coherent stories than they write--but in first grade. By second grade, they write stories that nearly equal the coherence of their dictated texts. The first-grade children in Pappas' sample achieved mean cohesive harmony scores in dictation of .81, while those in the present study achieved cohesive harmony levels in writing of .68 at the outset of grade two. While these two populations are not directly comparable, the findings suggest that differing modes and contexts for composing afford children opportunities to develop and consolidate their text-forming abilities which they then may adapt to the specific requirements of writing.

One of these requirements seems to turn on the need to establish clear, unambiguous identity relations prior to expanding the range of similarity relations generated in a text. Whether this requirement stems from specifics of the text genre that beginning writers create when asked to write a story, or whether the genre itself is adopted to to meet new damands created by the unique characteristics of writing cannot be determined from our data with absolute certainty. However, it is certain that the same children who dictated well-formulated fictional stories under conditions identical to those for writing stories produced a uniquely different written genre incorporating an obvious focus on text identity. Compare the written text, given first, with the dictated text that follows. They were written by the same child in late first grade.

(63) Once there was a tadpole who lived in a watertower
(64) And he thought that the watertower was the sea
(65) One day water started to drain out
(66) And he landed in a little boy's bathtub
(67) The mom was cleaning the bathtub
(68) And they took it to the sea

This text contains one text-extensive identity chain for tadpole, brief simple identity chains for watertower and bathtub, a complex but brief identity chain for mom and boy and an instantial equivalence of identity between watertower and sea. Treating the sea in line (64) as an equivalence relation, there is one similarity chain in this text.

Compare this story with the same child's dictated story.

(69) Once upon a time there was a dragon who could not fly
(70) So one day he went to ask his friend the bird what to do
(71) But when they were talking they heard a gurgling noise
(72) Then an orange and yellow and blue creature stepped out from behind the trees
(73) And he said ((sp: creature)) "What are you talking about?"
(74) And the dragon said "I cannot fly"
(75) ((sp: dragon)) "So I'm asking the bird what to do"
(76) Then the thing said "I can tell you what to do"
(77) And then the thing said "Just step into my house"
(78) ((sp: creature/thing)) "And I'll tell you what to do"
(79) Then the thing said "The reason you can't fly is because you don't have enough confidence"
(80) ((sp: the thing)) "And while you were trying to fly one day some of your feathers you lost because you got stuck in a tree and some of your feathers came out"
(81) ((sp: the thing)) "So you can stay at my house until your wing heals"
(82) So a week passed
(83) And his wing had healed
(84) So then the thing called the bird to give him flying lessons
(85) Each week he learned something new
(86) And the next week he learned how to fly up into trees without losing feathers
(87) The next week he learned how to fly into clouds without getting stuck
(88) And the next week he learned how to fly up in the sky without scaring birds
(89) And the next week he learned how to fly and do all those things together
(90) And the next week he learned how to fly perfectly

This dictation contains seven identity chains: a text-extensive chain for dragon, a complex chain for bird and dragon, an extensive chain for creature, simple chains for bird, feathers, house, and wing. But in contrast with the single similarity chain of the written story, the dictated text contains 12 similarity chains. In the dictated story, the child handles the complex problem of keeping identities clear by creating audibly different voices for each character-- a solution denied to the writer. But as writers, children must learn to use fully the resources afforded them by the reference system of English. This requirement may explain the distinctive identity emphasis of beginning written texts and may also account for apparent genre differences between dictated and written stories.

In the classroom, where opportunities to compare modes, contexts and tasks is neither covertly planned nor customary, it would be easy to mistake differences between dictated and written texts as deficiencies or to misunderstand the significance of specific facets of each.

A pervasive and sensible logic rests just beneath the surface of every dimension of writing development we have studied for the past four years. Confidence that such is the case would improve beginning writing instruction significantly. Context and mode differences suggest that various tasks and circumstances linked to purposeful opportunities to write promote growth and development by creating new conditions for using old knowledge and distinctively concrete contrasts for testing and establishing new knowledge (Bartlett & Scribner, 1981). Along with confidence that ability to learn simply awaits contextually grounded opportunity, all who deal with children's writing should reserve judgment about quality until sufficient evidence is available to comprehend the logic of ends pursued by children. The logic of language acquisition seems much more carefully prepared by nature and nurture than the logic of adult evaluation.

First-grade cohesive harmony scores illustrate another point. Viewed alone they indicate considerable variation in ability and modest levels of coherence. Yet viewed from the logic of what was being learned, and from the vantage point of one year later, neither the time it took nor the accomplishment itself seem trivial. The longer view allows even the level of coherence typical of first-grade texts to be appreciated more fully. This longer view could help to purge writing instruction of its concern for textual minutiae instilling instead a more crucial sensibility to the ends and logic of a text. The long view also is essential for appreciating the evolutionary nature of composing a text--indeed, of learning to write purposefully.

Future Research

Obviously the cohesive harmony index does not account for all factors that contribute to coherence. In the hands of a gifted writer, the skillful use of metaphor, the creation of an almost palpable ambiance, and even personal commentary surge through every sentence-- all harmonies that contribute to the coherence of a text. Children's texts, on the other hand, though organized and unified in many respects, suffered from looseness in logic and an uncertainty of aim, from a subdued or unstated stance toward action and character, and from the absence of sustaining theme and metaphor. Some of these qualities may be impossible to capture in any index, but others can be. As noted in the discussion of measurement issues, Hasan (1982) has begun to flesh out dimensions of organic and structural cohesion. These facets of cohesion can be expected to reflect the unifying and ordering qualities of interpersonal and logical components of meaning, qualities that would capture aspects of coherence that the index now makes no claim of addressing. The current index was conceptualized to deal only with experiential and nonstructural textual components of the semantic system (Halliday & Hasan, 1980; Hasan, in press). As theory advances to explain how organic and structural cohesion contribute to coherence, the cohesive harmony index undoubtedly will be refined to incorporate means for estimating their relative impact as affected by field, context, mode, task, and development. Our existing longitudinal data base should be exploited toward these ends.

Currently available data also could bring into sharper focus the shifting effects of growth in the ability to construct recurrence chains, both in terms of range of chain types and depth of given chains, and growth in the ability to link chains through interactions. Correlations presented above indicate that all three factors contribute variably to coherence as a function of writing development. We now are reorganizing and regrouping data for multivariate analyses wherein various combinations of chain frequencies and proportions, central and relevant tokens, and cohesive harmony scores will serve as dependent and predictor variables. The precision to be gained through these studies would indicate how characteristics of growth in chain formation are associated with related growth in sentence construction. That there are complementary aspects of such growth is clear. Now these relationships must be explicated.

Another issue that can be illuminated and clarified also simply requires additional analyses. When it became obvious that considerable genre variation existed in the writing samples we were obtaining--despite efforts to tighten up story-writing procedures--controlling for such variation rather than accounting for it in data analyses became imperative. Given the number of subjects in the sample and the number of factors in the design, accounting for this variance by adding a genre factor as a between-subjects comparison was unwarranted because genre would have been hopelessly confounded with other between-subjects factors. We were thus left with control as a design solution. The price paid for control was loss of an opportunity to compare text characteristics between these two populations-- children who wrote stories no later than second grade with those who, though able to dictate stories, wrote them only later in development. The value of this kind of follow up is twofold. First, it will reveal what aspects of genre are tied to negotiating the intricacies of reference in writing. Second, it can provide a basis for determining what kinds of referential relations distinguish between the two populations of children, those who wrote stories earliest and those who wrote them later.

There are, of course, other less well-defined questions which a longitudinal data base can address. For example, the emergence of a stronger interpersonal component of meaning in children's texts seems to coincide with their growing awareness of the logical meanings of conjunctions, the logical implications of different forms of parataxis and hypotaxis, and their uses of these interpersonal and logical dimensions of meaning in constructing a dialogue between writer and audience. How these factors interact and develop in children should contribute much to our understanding of their evolving sense of audience and the ways in which that sense steadies and aims their discourse.

How children grow and develop is a primary source of knowledge for shaping their educational experiences. The story of their growth in writing, now being documented by a variety of scholars, still is in the early chapters. So far, it is an exhilirating tale of competence and discovery, a continuing search for answers to old questions. Child and scholar both share in this quest.

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APPENDIX A

Primary Procedures for Obtaining and Analyzing Original Data Base

APPENDIX A

Procedures of the Study

The purpose of this study was to describe the transition children make from oral to written texts, in respect to their use of cohesive devices in two modes of oral, and one mode of written, language, and their inclusion of particular story structure elements in the same three modes. The approach chosen to realize the goals of the investigation was a longitudinal study of two groups of subjects:

36 children, grade 1 through 2

36 children, kindergarten through grade one

The two populations permitted both, cross-sectional comparisons between groups as well as longitudinal comparisons over a period of 16 months. This report, however, will describe only the grade one through grade two population, as required in NIE Grant 79-0039. This population was stratified by sex, school, dialect and socio-economic class. They were observed at three-month intervals, across three modes of discourse: writing, dictation, and story retelling. These three contexts were expected to influence the production of texts differentially over the five observations, yeilding comparisons in the number and kinds of cohesive ties employed in each mode, as well as comparisons of the structural characteristics of texts produced in each mode.

Selection of Subjects

To study writing, a first essential was to select schools and classrooms in which the curriculum encouraged writing from children during the first two years of school. A second necessity was to locate schools where research associates could easily move in and out of classrooms to collect data and/or work with individuals or groups of children. A third requirement was to identify schools which reflected the characteristics of urban and suburban schools in America including, particularly, the language and socio-economic differences which prevail in these schools--because both, language and socio-economic factors have been implicated as important factors in school achievement.

The urban school selected as a site for this study contained a population of Black children from the neighborhood and a sizeable population of white middle class children transported to the school by bus. This fortuitous situation allowed us to observe children whose social backgrounds differed substantially, and who had in common a new kind of educational environment. Choosing a suburban school allowed us to compare the middle class children in the urban school with a like population in a different setting. A more detailed description of the schools, hereafter referred to as Urban and Suburban, follows.

Urban School

The Urban school, designated as an alternative school, is located in the central area of a large mid-western city, and it provides schooling for children pre-kindergarten to grade six. It is an open-space school with multigrade groupings in each work area. The school avoids grade level labels and, thus, each large classroom space is referred to as the Red Area, the Blue Area, or the Yellow Area.

The first year our first-grade subjects were located in the Red and Blue areas and distributed across five teachers. The Red Area housed kindergarten and grade one pupils, and occupied two separate but connected classrooms. The Blue Area was a vast wall-less carpeted space that was open to the library, located a half-flight above. There were three teachers for the 90 children, two aides, and two special reading teachers.

The teachers planned jointly and often brought the children together for large-group activities. Most of the work, however, was individualized or accomplished through small-group instruction. A very strong part of the program was the opportunity children had to talk with peers and with adults. The children had the benefit of special teachers in physical education, art, music and drama, as well as the help of students from local colleges, who were at various stages of teacher preparation.

Because of its location in the downtown area, Urban used the nearby community resources (e.g., art gallery, Center for Science and Industry, and businesses) as an extension of the classroom. Children in the Blue Area frequently took walking trips to places of interest.

Children from any elementary school in the city may make application to attend Urban School. While children in the neighborhood are given priority, there is an attempt to make the school population reflect the school system, as a whole, in terms of racial background, achievement, and socio-economic status.

During the first year of the study, the 24 subjects in Urban were distributed across five class teachers. The following year they were located with six different teachers, and in three work areas:

Teacher:	CC	MB	MS	DH	SB	BS
	6	3	4	7	2	6

This distribution, of course, made observations and work with children extremely time consuming and data collection very complex. While teachers were similar in their concern for children and their learning, they differed greatly in teaching style, approaches to literacy, and interest in children's writing. They were not expected to follow a set course of study in reading and writing, but rather, were in the process of developing one for their school. While this gave the teachers and children a great deal of freedom, it meant that the curriculum was ever chinging and not very predictable. Emphasis in

literacy instruction was on skills--in word recognition, handwriting, and spelling. A wide range of textbooks, audiotapes, and duplicated materials were used in teaching reading--usually at the discretion of each teacher. For instance, one teacher used experience stories written on charts, as a means of teaching reading.

Over the 15 months of the Project, change in emphasis and materials did occur. More attention was given to the content of children's writing, to exposing children to clusters of books and stories of a similar genre, and to reading aloud to children and telling stories.

Suburban School

The Suburban School was located in the oldest part of the most affluent suburb in the metropolitan area. It too was an alternative school for parents in that city who wanted their children to be educated in an environment that was less formal and prescriptive than that existing in most schools in the district. The school, which served a population of kindergarten through grade six, was housed in three separate buildings or "pods," each consisting of four classrooms. The school was located on the same grounds as the oldest elementary school in the district. Some facilities (library, playground, gymnasium) and resources (special teachers and health services) were shared, but the administration and curriculum were separate.

For almost a decade a core of teachers and the principal of the Suburban School had been studying and implementing informal or progressive approaches to educating children. The classrooms were arranged with work areas, including resource centers with materials for art, mathematics, and science; book and quiet reading areas; and open spaces where the class could meet as a group. Most instruction was individualized or conducted in small groups. The children were free to move about the classroom and to work with one or two friends; thus, peer teaching/learning became an important element in the instructional process. Every effort was made to integrate the curriculum which was organized around focal interests or longer units of study. The first grade, for example, typically studied foods and visited a super-market and distribution center. The second/third grade class pursued interests in witches, horses, plants, and the human body. Reading and writing were usually integrated with these projects, but some small group and individual instruction was given to reading. A great emphasis was placed on literature and using a range of books, both fiction and nonfiction, in all studies. Literature was studied for itself too. Teachers frequently read aloud to children, discussed books with them, and often organized books for study around a common theme, concept, author, or illustrator.

The teachers varied, of course, in their understanding of integrated learning and ability to implement the concept. They varied also in their beliefs about effective ways to foster literacy. When the Writing Project began, the subjects in mid-first grade were distributed across two classrooms: one was a kindergarten/first grade; the other, a first/second grade. In both classes, teachers used a modified language experience approach in which experiences were charted. In turn, these

charts often were copied by children. Great emphasis was placed on correct spelling and capitalization, so lists of words in manuscript writing were made available to children before they began any personal writing. This emphasis changed over time as teachers saw that children had more spelling ability than they had been able to use and that they wrote more and better texts when freed from spelling constraints.

The second year of the study the subjects were again distributed over two classrooms, both containing pupils in grades two and three. Again, the teachers differed. One placed strong emphasis on language and literature, and the other emphasized science and physical activities. Both, however, participated enthusiastically in the study and appreciated the growth in writing they saw their children experiencing.

Subjects (24) were drawn from the first grade of an "alternative" school, an elementary school so designated because of its open enrollment, open-space, and open curriculum. This school was atended by children not only from a largely Black neighborhood with an SES distribution ranging from low to lower middle class, but also from middle class neighborhoods throughout the city. An additional sample (12) was drawn from the first grade of a suburban school with a Socio-economic Status (SES) distribution ranging from middle to upper class. From the former population, 12 subjects were identified as vernacular Black dialect speakers, using the revised measure of standard English proficiency noted above ($\underline{M}$ = 21.67; $\underline{SD}$ = 5.99). Subjects scoring ten or more on this measure were assumed to be vernacular Black dialect speakers.

Identifying Black-Vernacular Speakers

We hypothesized that dialects or codes may be related to exophoric reference. Evidence suggests that speakers of Black English vary considerably, both as individuals, and as a group, in the number and kinds of forms they produce in varying circumstances (Carroll and Feigenbaum, 1967; DeStefano, 1973; Dillard, 1972; Labov and Cohen, 1967).

To assure that subjects spoke vernacular Black English, three alternative screening techniques were considered: (1) technical detailed linguistic interviews (Labov, Cohen, Robins, and Lewis, 1968; Fasold and Wolfram, 1970); (2) semi-informal interviews (Shuy, Wolfram, and Riley, 1968); and (3) sentence repetition tasks (Garvey and McFarlane, 1970; Politzer, Hoover, and Brown, 1974; Rentel and Kennedy, 1972). Given the inter- and intra-subject variability noted above, sentence repetition tasks were employed because these tasks discriminate among subgroups on items where a difference exists between the form presented, and a form habitually used by a subject and offered as a substitute, with relatively high reliability (Garvey and McFarlane, 1970). In addition to the advantages of increased discriminability and reliability, sentence repetition tests require less time and less exacting training for their proper administration. Ten structures from the Garvey and McFarlane

scale with reliability coefficients greater than .55 were selected and included in the scale, (four repetitions of each structure) for a total of 40 items (see Appendix A).

Determining Socio-Economic Status

During the first few weeks of the study (February 1979), the socio-economic status of those children for whom parental permission forms were received was determined by using a modification of the Index of Status Characteristics (Warner, Meeker, and Ellis, 1949), a scale which rates occupation, source of income, house type and dwelling area (see Appendix B). Because Warner's occupation ratings are dated, Hollingshead's Job Scale was substituted and weightings adjusted. Weighted totals of the four subscales comprised the SES score for each subject. The total scale had a range of 12-84.

All 20 of the vernacular speakers fell within the bottom quartile of the SES distribution, leading to the conclusion that, at least within this population, their dialect was socially constrained--that is, a sociolect (DeStefano, 1973). From this population, six males and females were drawn at random ($\underline{M}$ = 71.00; $\underline{SD}$ = 8.51). Middle class subjects were drawn from both, the same inner city school, and from a suburban school, (six males and six females from each) in order to contrast school and control for class differences.

Dugan (1977) found that first-grade boys differed significantly from first-grade girls both, in the amount, and kinds of information they incorporated into their retellings of stories. Sex also appears to be a factor in the number of vernacular black forms produced by a speaker (Wolfram, 1969), women using fewer Black English forms than their male, ghetto counterparts. To control for these expected differences, sex was incorporated into the design of the study as a blocking variable.

One of the most vexing problems in longitudinal research is, of course, subject mortality. To compensate for the possible loss of subjects from the group of 36, initially drawn at random from the total stratified subject pool, two additional subjects were drawn randomly from each level of the pool--as noted earlier, stratified by dialect/socio-economic class, sex and school--and assigned to each level of the design. Data were obtained on these 12 replacement subjects, all blind to their identity as replacements. Thus, eight subjects were assigned to each cell constituting the blocking variables in the study. Two subjects were lost from the lower class, female, vernacular-speaking, urban-school cell. Two also were lost from the middle class, female, nonvernacular-speaking, urban-school cell. To obtain equal numbers within each cell, two subjects were dropped at random from the remaining four cells in the design for a total of 56 subjects.

To determine the extent to which the assignment of replacement subjects to the design had affected the composition of these levels, scores for middle class subjects from the Index of Status Characteristics

were subjected to an analysis of variance having two between-subject comparisons--sex and school. The results of this analysis are presented in Table 1.

Table 1

ANOVA of Socio-Economic Class by School and Sex

Source	df	MS	F	p <
School (A)	1	222.04	5.39	.05
Sex (B)	1	35.04	.05	
School X Sex (A x B)	1	22.05	.54	
Error (W/Ss)	20	41.19		
Total	23	47.95		

As can be seen from Table 2, subjects from the suburban school scored significantly lower on the Index of Status Characteristics. As indicated by Table 1, there were no other significant effects.

Table 2

Means and Standard Deviations of Socio-Economic Class by School and Sex

Index of Status Characteristics	Urban School	Suburban School
Mean	38.33	32.25
Standard Deviation	7.47	4.41

Quite obviously, replacing subjects in the urban school population unbalanced the equality that had been established within the middle class population for the two schools. This finding of school differences, thus necessitated a design arrangement wherein the suburban population had to be treated as a distinct subgroup. Therefore, data from the suburban school were analyzed, both separately, and in a school replication arrangement for all MANOVAS, ANOVAS, and discriminant function analyses. These design arrangements are discussed in later sections of this chapter.

The import of this difference between the urban and suburban middle class populations must be kept in perspective. The Index of Status Characteristics, the socio-economic scale employed in this study, has a weighted score range of 12 to 84. Both means reported in Table 2 rest well below the midpoint of the scale (48), and clearly within the "middle class" spectrum on the scale. Whether or not treating class extremes such as "middle class" or "lower class" has any greater import for language variation than significant differences found to exist within these larger categories has not been established. But, there is no good reason for ignoring such "within-class" variations. Therefore, the finding that middle class children in the two schools differed significantly on the Index of Status Characteristics argued for the inclusion of a school replication study as a minimum and separate analyses for each school, as necessary, where differences in the replication study were obtained.

Data Collection Procedures

During the early weeks of the study, research associates worked in the classrooms with individuals and small groups of children. They read stories to them, invited children to retell the stories, or to tell others "they knew." The research associates also encouraged them to write, often providing materials in the form of colored paper, booklets, or flow pens. Children also were given the opportunity to dictate stories of their own composition, with the researcher acting as scribe. The oral story retellings, as well as the dictated stories, frequently were audiotape recorded to prepare the way for the recording to be done as a part of the later data collection. These activities were carried out in the regular classroom or other available vacant rooms in the schools. Prior to the actual data collection, all children had the opportunity to hear, tell, and dictate stories.

The language samples in the three modes were collected in March 1979, October 1979 and May 1980. Seven research associates participated in the data collection, but all had been working in the classrooms and were known to the children as visiting teachers. At least one associate worked regularly with each classroom and knew the children well. All researchers were trained in data collection procedures (see appendices C and D).

Story retelling data usually were collected in a single day at school, this was followed by the collection of dictation data, which required three or four days in each school. Every effort was made to fit the dictation and writing experiences into the ongoing life of the classroom. The writing was carried out in the classrooms, with the teachers discussing the assignment with their children.

Story Retelling

Three very different folktales were chosen for the retelling experience. The quality of the story, reasonable length for retelling, and children's lack of knowledge of the tale, were among the criteria that influenced selection (see page 35 for others).

In small groups of four to six, children were taken out of the classroom to a room in the school where the stimulus story could be read without interruption. One member of the research team served as story "reader" and the others as "listeners" for the retellings. The children were told they would be read a new story that the reader had enjoyed and wanted to share with them. The reader also told the children they would each have the opportunity to share the story with a visiting teacher when the reading was finished. The reader then read the story as it typically would be read in the classroom, providing enough time so that the pictures could be viewed. Upon completion of the story, the reader went through the book a second time, showing each page in turn, not commenting but accepting any spontaneous comments about the story from the children. If, at any time, a child indicated concern about being able to remember everything about the story, in retelling it to another, he was reassured that it was all right to retell only what he could remember.

Following the reading each child was taken to a "listener" member of the research team who was introduced as a teacher who did not know the story that had just been read. The number of listeners matched the number of children in each story reading group so that no child was made to wait, i.e., the time and activity between the end of the reading session and the retelling was uniform for each child. In introducing the listener, the reader explained to each child that the visiting teacher did not know the story that had just been read and stated that the teacher would like to hear it. The reader then left the room, the listener reaffirmed the task, explaining that the retelling would be tape recorded for the purpose of sharing it with other teachers who were interested in stories. Once the child began his retelling, the listener tried not to interrupt the child's narrative. The listener was attentive, but did not collaborate in the child's text production. The intent was to allow the child to construct his own text and to avoid additions by the listener to the content or structure of the narrative.

Dictated Story Data

Dictated stories were collected at the two schools during the two-week data collection period, exclusive of the two days devoted to story retelling. Expectations for dictating original stories to members of the research team had been established prior to the data collection; all children had previous experience in dictating stories to a researcher who acted as scribe while being tape recorded as an ongoing classroom activity. The child was told that his story was to be written for him,

that it could be as long (or as short) as he wanted, and that it could be about anything that interested him/her. Emphasis was placed on composing "your very own story," rather than retelling a well-known one (e.g., "The Three Little Pigs") or a recently-viewed TV cartoon.

The story was taken down in manuscript writing by the researcher. The child was aware that his words were being written and could see the actual writing if s/he wished. Children were given an unobstructed view of the scribe's activities and ample opportunity to observe the scribe take down their dictations.

Dictation proved to be a fairly popular activity in first grade, with most children requesting a turn with the scribe. Generally the order of data collection followed a volunteer pattern, with the scribes working with children who indicated their readiness with a story. At the time of collection each child went with a scribe to an available room in the school where a tape recorder had been set up. The dictation session was tape recorded, and the child was told that the purpose of the recording was to check on the accuracy of the scribe's copy before it was typed and placed in the classroom storybook. Once the child began dictating, the researcher attempted to keep up with the child's dictation pace, accepting any comments or instructions the child gave regarding the scribe's performance and/or the writing process, but was careful not to interrupt the child's narrative. In cases when a child dictated an obvious retelling of a known story or rhyme the scribe elicited a second dictated text after encouraging the child to tell his/her own story (see Dictation Procedures, Appendix D).

Story Writing Procedures

During the two-week observation period, an "assigned writing" sample was collected from each subject. Every effort was made to make this activity a natural part of the ongoing work of the classrooms. But in some situations, particularly in the early collections in grade one, the children were not accustomed to writing original stories. In fact, many did very little writing, and what was produced often was copied from charts or the chalkboard. In the beginning, it was therefore necessary to develop, with the teachers, conditions that would interest children and cause them to write a story within a period of one or two days. Emphasis was placed on writing stories. Thus, children were given colored paper or paper folded into booklets to further establish the story context. Teachers discussed the writing assignment with the children and tried to link it to work and experiences that children were currently involved in. Sometimes the discussion centered about stories, a wordless picture book, or a recent particular experience--a visit to a grocery store, or a performance by a mime. The contexts were varied, but a first priority of the investigations was to work within the curriculum and constraints of each classroom.

Sessions for assigned writing were not limited in time. Nevertheless, the children normally were to begin in early morning and continue for an hour or more, or until most children were finished. Anyone who had not finished and wished to do so, kept his story to work on through the afternoon and next day. The researcher, as well as the classroom teacher, was available in the initial writing session. The researcher then returned the next day to sit down with the authors and read through the stories. This last step was essential because children were encouraged to use their personal, creative, or invented spellings. Occasionally these renditions were beyond interpretation without the help of the author. The exact word intended was essential for the cohesion and story structure analysis, as well as for the spelling coding.

As soon as the writing was obtained, two copies were made and the original returned to the classroom, if so requested by the teacher. In most instances, however, the original script was retained.

Preparing the Oral and Written Texts for Coding

Preparation of the transcriptions of the audiotaped oral narratives produced in the two tasks (story retelling and story dictation) proceeded in two stages.

In the first stage, a complete transcription of each audiotaped data collection session was made. The stream of speech was initially segmented at the level of the orthographically realized word. Transcriptions were typed in traditional orthography with capitalization of proper nouns and the first-person singular pronoun. No punctuation was included in the typescripts. These original typescripts were unedited and included all verbalizations recorded during the sessions. Filled pauses, word and phrase repetitions, stutters, corrections and false starts were included, as were any verbal interactions between child and listener/scribe. Interjections by the adult were rare, but when they did occur, interjections typically consisted of indications of continued interest such as "hmm" or repetition of the child's most recent words following an extended pause. Unintelligible words or segments of text, which occurred very rarely, were noted in the following manner on the typescripts: (...), for what appeared to be a single word, and (... ...), for longer utterances. Lines of typed text were numbered sequentially and words spoken by the listener/scribe were identified with the letters: IN. (An example of an original typescript appears in Appendix F.)

Using both the prepared typescripts and the audiotapes, a research associate, working with a second researcher, edited the typescripts in preparation for coding. First, each child's narrative text was abstracted from the total language recorded during the taping sessions. There was no difficulty in determing text boundaries; the two editors agreed in all cases. Context supported by the children's use of

narrative conventions such as "once upon a time..." or "there was once..." and "they lived happily ever after," facilitated boundary decisions. Also of help in many language samples, was a shift into a "story voice" distinct from the conversational language intonation preceding and following the narrative text. Marked for exclusion from the analysis were non-silent phenomena such as filled pauses, unmotivated repetitions, and abandoned forms. These non-silent phenomena correspond to what have been called "mazes" (Loban, 1963), or "garbles" (Hunt, 1964), in descriptions of child language. Editors also marked listener/scribe interjections and child asides (examples of the latter: "I wanted 'landed'"; "did I say 'pigs'?"; "you like writing, don't you?") for exclusion from the narrative texts. Examples of verbalizations excluded from the narrative texts (marked by brackets and asterisks) are given below. The first example is from the retelling corpus and the second is from the dictation corpus.

[2.1] once there was an old woman and her little girl and they were really poor and they only had [a little] a tiny loaf of bread and then every day the little girl would go out [to find] to the woods to find some nuts and berries ...

[2.2] ... [um] the witch [um] went to feed the hogs then [um] the witch went to feed the chickens then the horses* did I say pigs did I say pigs*
IN:**you said hogs**
oh then pigs [she went to feed] she went to feed the pigs ...

Editing also involved identifying and marking the units upon which the subsequent cohesion and story structure analyses were to be based. While cohesion, Halliday and Hasan (1976) point out, is not limited to relations "above the sentence," the present study focused on the means whereby structurally unrelated units of language are linked together. Halliday and Hasan refer to this "intersentence cohesion" as "the variable aspect of cohesion" (1976, p. 9). The analysis of "non-structural" cohesion requires the identification of sentences or sentence-like units in the language to be analyzed. Linguists point out the difficulty of defining the "sentence" (Allerton, 1969; Crystal, 1976; Garvin, 1964). As Allerton notes, traditional definitions of the sentence are made in terms of the conventionalized written language, i.e., as a sequence of words lying between punctuation marks. Such traditional definitions were not useful for the oral language data of this study; therefore, an operational definition of a sentence-like unit that could deal with spoken English was selected: the "T-unit." As defined by Hunt (1964), the T-unit is a complex clause consisting of one independent or main clause with any dependent or subordinate clauses attached to it or embedded in it. The T-unit has been used in many studies of child language development--in both speech and writing--

because of its efficacy and reliability. This kind of reliability is particularly important to the present study of the cohesive relations between non-structurally related elements of children's oral narratives.

An additional editing procedure involved segmenting, or parsing, the texts into the T-units, upon which the cohesion analysis was based. Also at this point, selected symbols, found to be helpful during cohesion analysis in interpreting text and making coding decisions, were added to the typescripts. The full notational system used in editing the typescripts is presented in Figure 1. And an example of an edited original typescript appears in Appendix F. Following the editing procedure, typescripts were retyped, and coded identification number replaced all other identification on the protocols.

One copy of the children's writing was kept in its original state for analyses related to concept of message, spelling, and other writing conventions. The second copy of all those scripts judged to be a text were cast into T-units, edited, and transcribed (with all spellings correct), following the procedures used for the oral texts. Story structure and cohesion coding were done on the typed scripts that had been parsed into T-units.

Cohesion Coding and Analyses

Coding of the edited narrative texts followed the scheme set out in Cohesion in English (Halliday and Hasan, 1976). The five categories identified by Halliday and Hasan which represent types of cohesion (reference, substitution, ellipsis, conjunction, and lexical cohesion), provided the framework for coding. All instances of exophoric, as well as endophoric, presupposition, within these categories, were coded. While not contributing directly to the integration of a text (i.e., cohesion, as technically defined), exophora does contribute to the creation of text through linking language with features of the larger textual environment and, as such, bears on the question of interest in this study: what options do children use in creating their texts? All coding was done by two research associates and one principal investigator. A reliability check was run on a sample of ten randomly-selected texts, five representing each task. A research associate trained in cohesion analysis also coded the ten texts. The correlation coefficient calculated for the two coders was .96 (SPSS Subprogram Reliability).

As noted earlier, exophora is a type of phoricity which takes one outside the text. Exophoric items are presupposing textual elements, whose intended, more precise meanings, are mediated through extra-linguistic factors. While it is possible for the presupposition involved in reference, substitution, and ellipsis to be exophoric, occurrences in the latter two categories are fairly infrequent (Halliday and Hasan, 1976).

#	Used to mark the boundaries of each narrative text.
[. . .]	Used to mark non-silent phenomena (filled pauses, unmotivated repetitions, abandoned forms, etc.) and, following Hunt, considered extraneous to the T-unit.
* . . . *	This mark identifies listener/scribe interjections or child asides not considered a part of the child's intended narrative text.
** . . . **	Used to mark any responses to interjections or asides not considered a part of the narrative text.
/	Slashes mark T-unit boundaries and are numbered sequentially.
? !	Question and exclamation marks were added to the typescript when the child's intonation warranted it and proved helpful in subsequent cohesion analysis (no other terminal punctuation was marked).
" . . . "	Quoted speech in the text for which a speaker is lexically identified.
((sp:name))"..."	Quoted speech in the text which is not lexically attributed to a speaker but which can be attributed to a speaker based on context or the child's use of a role voice.
((sp:?)) "..."	Quoted speech in the text which is ambiguous with respect to speaker.
<u>underlining</u>	Underlining is used to mark contrastive stress or other kinds of emphasis used by the child which could aid the cohesion coder in interpretating the text.

Figure 1: Notational System for Editing Oral Language Transcripts

A system for subcategorizing exophoric reference was adapted from Hasan's forthcoming work (in press) on semantic styles. The subcategorization is based on the type of situational knowledge required for interpretation of the exophoric item. Using the criteria and terminology proposed by Hasan, the following subcategories of exophoric reference were coded in the data of this study:

Formal Exphora--Those items which are only technically exophoric. One's knowledge of the language and a shared cultural context allow an adequate interpretation. Thus, upon hearing or reading the utterance, "On her way home from school the reluctant scholar dropped her books in the street," one does not feel compelled to identify what street. Specific identification of the entity marked by the definite article is, in this instance, irrelevant. "Generalized" exophoric reference ("You [i.e., one] shouldn't feed the animals at the zoo"), "institutionalized" exophora ("Jim went to see the police"), and "homophora" (reference to a whole class or to a unique member of a class, such as the stars, the moon) were included in this category.

Instantial Exophora--Those items whose presuppositions are mediated via some elements in the immediate situation: reference is being made to some aspect of the here-and-now. For example, if an author begins his story with, "I went to Mars on a spaceship and had a great adventure," full identification of the referent of the pronoun is situationally possible. Even if not present at the text's creation, a partial identification of "author" is possible and usually adequate. In the narrative texts of this study, instantial exophorics were limited to first- and second-person pronouns.

Restricted Exophora--Those items whose intended meanings go completely beyond the immediate situation and are available to the listener/reader only on the basis of shared knowledge mediated by past experience. Thus, in a story retelling that begins, "They didn't have any food--just this little piece of bread. She went out to look for nuts and berries," identification of "they" and "she" is not possible without recourse to knowledge that goes beyond this retelling situation and this text. (If the illustrated story on which the retelling is based were present during the retelling, and the pictures were pointed to, then these exophora would be considered instantial. The book, with its illustrations, was not available to the child during the retelling task in this study.)

The semantic constraints involved in telling a story to another who claims not to know the story, require that one talk in such a way that one's meanings are available to the listener. The use of formal exophora and certain instantial exophora (those representing speech roles in the

situation) in the tasks of this study, were seen as unambiguous in these contexts of narration. However, the use of restricted exophora relative to the characters and events in the stories, was seen as ambiguous. In this study, formal and instantial exophora, whose meanings were considered available to the listener, were included for purposes of data analysis in the category of endophoric reference. Restricted exophora formed a spearate category for tabulating purposes. Thus frequencies within six categories of presuppositional "ties" were tabulated: reference, restricted exophoric reference, ellipsis, substitution, conjunction, and lexical cohesion. Appendix G contains an edited, retyped dictation text, along with a sample of the coding record for this text.

Analysis of the Cohesion Data

Differential use of cohesive ties in writing was compared in three separate MANOVAs where dialect, school, and sex served as the between-subjects factors and observation analyses, the within-subjects factor. MANOVA (Jones, 1966) was selected because it permits the testing of group differences in terms of multiple dependent variables considered simultaneously. MANOVA packages the dependent variables into a transformed composite variable, Y, which represents a linear combination of the response variables weighted to maximize a discriminant criterion. A significant MANOVA test statistic suggests rejection of the null hypothesis of no difference among group centroids. If overall differences among groups are found, follow-up techniques allow the assessment of the relative contribution of each of the dependent variables to those differences.

Three separate comparisons were made because, in each instance, there was no comparable population. In one comparison, the objective was to explore differences between schools; in another, differences between dialects within a single school; and in the third, differences between sex over observations. They are listed below:

MANOVA 1	School X Sex X Observation
MANOVA 2	Dialect X Sex X Observation
MANOVA 3	Sex X Observation

Figure 2. Cohesion Multivariate Analyses of Variance

Text length was free to vary in the narrative tasks of this study. To allow for differential text length, frequencies of ties within the six categories identified for coding were expressed as a proportion of total ties for each text. Following the coding, it was observed that reference, conjunction, and lexical cohesion were used extensively by all children in the tasks. Ellipsis and restricted exophoric reference were

used by most of the children. Moreover, use of these latter two categories of linguistic devices involved more than one instance in the great majority of cases, although their relative frequency of use did not approach the magnitude found for reference, conjunction, and lexical cohesion. Substitution, however, as a text forming device, was used by few children in the samples, and even fewer had more than one instance of substitution in their texts. Therefore, this category was eliminated from the multivariate analysis of variance, performed on the proportion scores of the remaining five categories. These categories were: exophoric restricted reference, ellipsis, conjunction and lexical cohesion.

Since proportion scores were to be used in the MANOVA, they were subjected to an arcsine transformation to conform to the assumptions of the multivariate normal distribution. The arcsine transformation results in a variable that is normally distributed with a constant variance. Computer program CANOVA, a component analysis of variance (Clyde Computing Services, 1973) was used for the MANOVA analysis. The test of significance employed was Wilks's likelihood ratio criterion, transformed into Rao's approximate F.

Story Structure Coding and Analyses

Texts may be thought of as having fixed and variable elements. The purpose of text analysis is to characterize these two properties. Propp (1968) attempted to specify the fixed properties of Russian fairy tales according to the functions of the dramatis personna, focusing upon what characters do rather than upon who carries out actions or upon how actions are accomplished. Functions abstractly represent actions. They are defined without reference to the character who performs them. A person who helps the hero satisfy a need can vary from tale to tale. The helper can be a witch, the hero's friend, or a stranger. The underlying action is the same. But since the action does take place within the overall set of actions that go to make up the tale, a given act can have different meanings. Someone who helps the hero obtain an agent necessary for satisfying a need renders a service far different from a person who helps lure the hero into a trap. Thus identical acts can represent quite different functions. And quite different acts may have the same meaning. For example, a warning to a child not to go into the forest differs significantly from one given to a combatant in the course of a conflict. A function is always defined relative to its significance for the course of the action.

Functions, therefore, serve as fixed elements in a tale. They are the basic constituents of the story. Propp identified 31 functions. Not all functions, however, must occur in a single tale. When functions do occur in a tale, they ordinarily do so in a particular order. Thus, order constitutes a second fixed element in a tale. Order grows out of the elemental logic of actions. Help cannot be given without some pre-existing need for it or without some circumstance

wherein the hero's plight is made obvious. Likewise, the transfer of money must be preceded by a clear need or a rendered service. Thus, order derives not from convention, but from the logic of events and actions. Tales with the same functions and orders are most likely representative of the same genre. But too much should not be made of order. Even in Propp's analysis of Russian tales, he was forced to posit the notion of transformations to account for tales whose functions appeared in a noncannonical order. If the order of functions follows logically from the nature of the actions, then it is not necessary to preserve cannonical order.

Subsidiary or minor tales may be embedded within, or follow upon, the major tale. Propp referred to these subsidiary tales as moves. The terminology is not critical. Thus, we too referred to all such subsidiary actions as moves. What is significant about them is that parallel, repeated, and sequential moves, complicate a tale, giving rise to the question of how such subsidiary moves are to be coded and scaled. Propp, of course, solved the problem by bracketing moves. He specified that two functions were the basis for assigning a bracket, i.e., villainy and lack. In addition, two pairings--struggle, coupled with victory, and a difficult task, coupled with its solution--constitute mutually exclusive elements, distinguishing villainy tales from seeker tales. A tale, conceivably, could contain both pairs, one pair, or neither pair. Their presence simply helps to distinguish between moves, but in no way should be considered obligatory. What is obligatory is villainy or lack.

Functions may have double meanings. For example, in Magic Porridge Pot, the mother lacks knowledge of the witch's interdiction, which, of course, she cannot help but violate. Both lack and violation of an interdiction were coded because both meanings were inherent in the action that ensued. A text also may be vague in terms of the actions of a character which, in turn, makes functions difficult to assign. For example, the text says: "Mother Goose was going out." But no further mention is made of her actions. Is this sufficient as a case of absention? Coding in these instances was governed by the principle of assigning functions on the basis of consequences. Did the tale proceed as if absention occurred? If so, then the meaning of the function was absention and so coded. If the tale continued with subsequent actions indicating Mother Goose did not go out, then absention was not coded. Questions of this sort were always resolved by defining the function according to its consequences.

Interjudge Reliabilities for Coding Proppian Functions

On separate occasions, the same pair of judges coded two sets of protocols from two different story retellings. Interjudge reliabilities were computed for each set of 20 protocols (.85, .89). Dictation protocols (36) were coded by a different pair of judges, who achieved a slightly higher level of reliability than the first pair (.93). Overall, however, reliabilities were sufficiently high to warrant confidence in function definitions and coding procedures (see Appendix H).

Genre Classification

After judges had been trained and interjudge reliabilities had been extablished, each protocol then was classified as to its genre of discourse. For, even though task instructions to the children had specified that they tell or write stories, many children produced other genres of text. Protocols, thus, were classified as follows:

1. No Text--No utterance produced by the child.

2. Statement/Label--A single word or phrase defining or describing something in the immediate environment. For example, "It was a duck," or "Desk."

3. Composition--A present tense depiction of a child'e current experience. Compositions are closely identified with the circumstances, in and for which, they are produced, i.e., completing a writing assignment for the teacher. To illustrate: "My mom is nice. I go to school. My mom loves me."

4. Interaction--A text with many elements of a dialogue having an implied listener with whom an experience is being shared. For example: "First, you draw a circle. Then you draw a line. Then you make another line here."

5. Chronicle--Narrative that parallels real events in a child's life, yet expressed in a story frame with conventions such as, "Once a little girl and boy went to Disneyland." Characters and actions that parallel non-fictive experience and thematic unity, characterize these texts.

6. Tale--Narrative that sets forth events and circumstances that may reflect real life but without essential dependence on historical fact. They have thematic unity, conventional story markers, and fantastic characters, as well as fantastic events. They are fictive in nature.

Following genre classification, chronicles and tales were coded and scored for Proppian functions by five judges blind to subject identity but aware of context variations. There was no way to conceal these differences entirely, because retellings, of course, were about the same well known stories. Only retellings and dictations were compared. Despite instructions to the contrary, many children failed to produce chronicles and tales in the writing context, thus precluding comparisons with a measure that presumed a story genre. As reported above, interjudge reliabilities were moderately high. Still, occasional coding problems and questions arose. Two judges resolved such questions and assigned a function as agreed. It should be noted that in scoring the retellings, no attempt was made to assess recall. Only the functions

found in the children's texts were scored, regardless of whether or not a counterpart for a given function could be found in the tale the children had heard. The present study sought only to compare "packaging" and production of functions. Studies of the role of memory and comprehension in production are under consideration for later analyses, and one completed study will be presented in Chapter 6.

Selecting Stories for Retellings

In selecting stories for retelling, a main concern was to find stories that were not known to our subjects, but would likely interest them. Our subjects varied greatly in their experiences with traditional literature. They ranged from one group, that seemed to have some acquaintence with almost all stories considered, to another whose backgrounds were meagre. Selecting stories became more of a problem than originally anticipated.

At the onset of the project, most Russian fairy tales were too long and complex for some of our subjects. We looked for well-formed and artfully illustrated folktales, especially for recently published ones or new versions of old tales. To heighten interest, we chose to use picture books, but this decision constrained our choice of stories.

Three very different stories were eventually selected for story retelling--a modern fable, a folktale, and a Russian fairy tale.

Squawk to the Moon, Little Goose, by Edna Mitchell Preston, illustrated by Barbara Cooney (Viking, 1974).

Magic Porridge Pot, by Paul Galdone (The Seabury Press, 1976).

Salt, by Harve Zemach, illustrated by Margo Zemach (Holt, Rinehart and Winston, 1967).

Squawk to the Moon, Little Goose is a story of lack that has, embedded within it, three brief tales of villainy which provide the trebbling element found in many folktales. The story also contains folktale features of trickery, and also refrain, as with Little Goose's, "Good's good and bad's bad."

In Proppian analysis, the tale had two moves.

a (beginning situation)
2 (interdiction) coupled with 1 (absentation)
8a (lack: maturity and insight) and 3 (violation of interdiction)
...
6 (trickery) coupled with 7 (complicity)
8b (villainy)
10 (counteraction)
11 (departure)
12 (preparation)

13 (reaction)
15 (translocation)
8b (villainy)
9 (mediation)
10 (counteraction) coupled with 14 (receipt)
18 (victory) coupled with 19 (liquidation)
...
20 (return)
30 (punishment)
31 (equilibrium)

Magic Porridge Pot is one version of the magic pot tales that exist in several different cultures. It is especially appealing to children because it is the mother sho uses the magic pot without permission and as a result creates a huge problem which the daughter solves.

Actually, Magic Porridge Pot is two tales, conjoined by an interdiction given in the first, and violation of the interdiction, in the second. In Propp's terms, it is a tale with two moves:

a (beginning situation)
8 (lack) joined with 11 (departure)
9 (mediation)
12 (function of donor) and 2 (interdiction)
14 (receipt of magic agent) and 15 (transference)
19 (lack liquidated) and 31 (equilibrium)

The final state of happiness in the first tale provides the beginning for the second.

1 (absention)
8a (lack) and 3 (violation of interdiction)
20 (return)
19 (lack liquidated)
31 (equilibrium)

Salt is a story of the younger brother, "the fool," succeeding in making his fortune while his two older brothers turn to villainy and fail. It is a tale of lack--lack of status, success--in which a tale of villainy is embedded. The villainy tale is interrupted by a giant's story, a tale of interdiction and lack.

a (beginning situation)
8a (lack), 11 (departure) and 12 (donor)
14 (magic agent) 15 (transference)
25 (difficult task) and 26 (solution of task)
30 (reward to hero) and 31 (promise of marriage)

a (beginning situation) and 11 (departure)
5 (delivery of victim to villain) 8 (villainy)
...

a (beginning, giant's tale)
8 (lack of transport, giant's lack of happiness)
2 (interdiction) 15 (transference)
20 (return home)
...

27 (recognition of hero)
28 (exposure of false hero)
30 (villainy punished) 31 (wedding)
...

3 (interdiction violated)
25 (difficult task)
26 (solution)
31 (equilibrium)

These stories were analyzed to determine their comparability in terms of Propp's functions. The criteria on which they were compared were: (a) total number of functions in a story, (b) the number of different types of functions in a story, and (c) the number of moves in a story. As noted earlier, a given function may occur in a story more than once, either through trebbling, or additional moves, roughly reflecting the tale's length. On the other hand, the number of different types of functions suggests something of the tale's richness while number of moves may indicate complexity. As can be seen from Table 3, Salt and Squawk to the Moon, Little Goose are equally rich, though Salt is shorter and somewhat more complex. They differ considerably, however, from Magic Porridge Pot, a fairly straightforward and brief story with a slight ironic twist in the second move. Both Salt and Squawk to the Moon, Little Goose contain parallel action and multiple embedding. While Squawk to the Moon, Little Goose embodies the simple, but clear, moral ambiance of a fable for children, Salt has all the atmospherics of a true Russian fairy tale. Thus, each story constituted a rather different experience for each retelling.

Table 3

Number of Functions, Types, and Moves in Three Stories

Stories	Functions	Types	Moves
Squawk to the Moon, Little Goose	29	18	2
Magic Porridge Pot	15	12	2
Salt	22	18	3

Analysis of Story Structure Data

Both multivariate and univariate analyses of variance were employed for story structure comparisons. For the multivariate analyses, as with cohesion, computer program CANOVA (Clyde Computing Services, 1973) was used. This program tests for significant differences with Wilks's liklihood ratio transformed to Rao's approximate F. Significant multivariate differences were followed-up with univariate analyses of variance.

Number of functions, function types, and moves, served as dependent variables in six complementary multivariate analyses of variance performed on the story structure data. In the first of these analyses, 144 scores for each dependent variable were organized into a mixed design, where sex (six males and six females) and dialect (six vernacular and six nonvernacular) served as between-subjects comparisons, and where modes of discourse (retelling and dictation) and observation periods (Spring 1979, Autumn 1979, Spring 1980) constituted the within-subjects comparisons. This study was designed to compare factors within the urban school setting. Similar design arrangements were employed in a second analysis whose purpose was to compare the urban with the suburban school controlling for dialect. While only middle class children from the two schools were compared, the two populations did differ on the index of status characteristics with t (24 df) = 2,79 ($p < .01$). Children from the suburban school averaged from middle to upper-middle class on the "index" (M = 33.33; SD = 4.37). While those from the urban school, averaged somewhat higher scores on the scale (M = 38.33; SD = 7.79). The two populations had been equated on the scale at the outset of the study, but because of subject mortality and replacement, this initial equality was lost necessitating a school comparison. For this comparison, dependent variables were organized into a 2 x 2 x 2 x 3 mixed design where sex and school were the between-subjects factors and where modes and observations were the within-subjects factors. A third multivariate analysis of variance then was employed to examine only the suburban school. As before, number of functions, function types, and moves, were organized into a mixed design with one between-subjects comparison--sex (six males and six females)--and two within-subjects comparisons--modes and observations.

Three additional multivariate analyses of variance focused upon dictation. Retelling was removed as a comparison in order to obtain a clearer view of dictation over the three observation periods--retelling differences having potentially spurious origins in the variance associated with apriori story differences. In all other respects, design goals and arrangements were identical to those reported above.

Significant MANOVA test statistics were followed up by univariate analyses of variance. These designs compared the same variables, organized in the same ways reported above, for the multivariate analyses. Significant univariate F ratios were subjected to Geisser-Greenhouse

conservative F corrections for repeated-measures designs. Post hoc comparisons were made using Tukey's H.S.D. procedure.

Procedures for Coding Concept of Message

Two additional univariate analyses of variance were performed on functions and function types from texts produced by a sample of subjects who were able to compose unequivocal fictional narratives. Just 14 subjects were able to do so by mid-first grade. This number rose to 27 at the end of grade two. The point of these two analyses was to obtain developmental data controlled rigorously for genre. Other genres of text were excluded from these analyses to eliminate genre as a contaminating source of variance.

During the early stages of becoming literate, young children begin to gain control over basic concepts about the organization of surface features of written language. They learn the specifics of how texts convey information, e.g., that the groups of letters, not the pictures, carry the message, or that particular patterns of letters correspond to particular spoken words (Clay, 1975; Henderson, 1980). Simultaneously, they also internalize and use the rules governing direct physical aspects of text, e.g., conventions of spacing and directionality. As part of this study, samples of children's writings were examined to see how children differed in their understanding and use of these principles.

Sets of exhaustive, mutually exclusive categories, were developed for each of the three dimensions of Concept of Message, Directionality, and Spacing. (These will be described in greater detail in the section, Results and Discussion: Conventions of Print.) Based on their writing samples, each subject was classified as being in one category, for each dimension, for each of the five observations. Because of the explicit nature of the categories (e.g., percent of word boundaries observed, string of random letters), a single investigation--working with the writing samples and data collectors' written comments--classified the data. No assumptions have been made about the linear or progressive nature of the categories. It was expected however, that, in a general way, subjects would be classified in the higher number categories as they gained more control over the conventions. The number and percentage of children per category was tabulated by sex, dialect, school, and observation. These data will be reported in Chapter 3.